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ABSTRACT

This document consists of one volume year (four quarterly issues) of the journal "HyperNexus," containing articles on hypermedia and multimedia use in education. Article topics include future uses of the technology; interactive videodisks in early childhood education; language-learning software; tips for using LinkWay, HyperCard, electronic publishing software, and similar tools; virtual reality; instructional technology integration; adding sounds to hypermedia environments; World Wide Web technology and information sources; helping students design World Wide Web documents; and multimedia design issues. Columns include editorials, hardware and software updates and reviews, and Internet news. (AEF)

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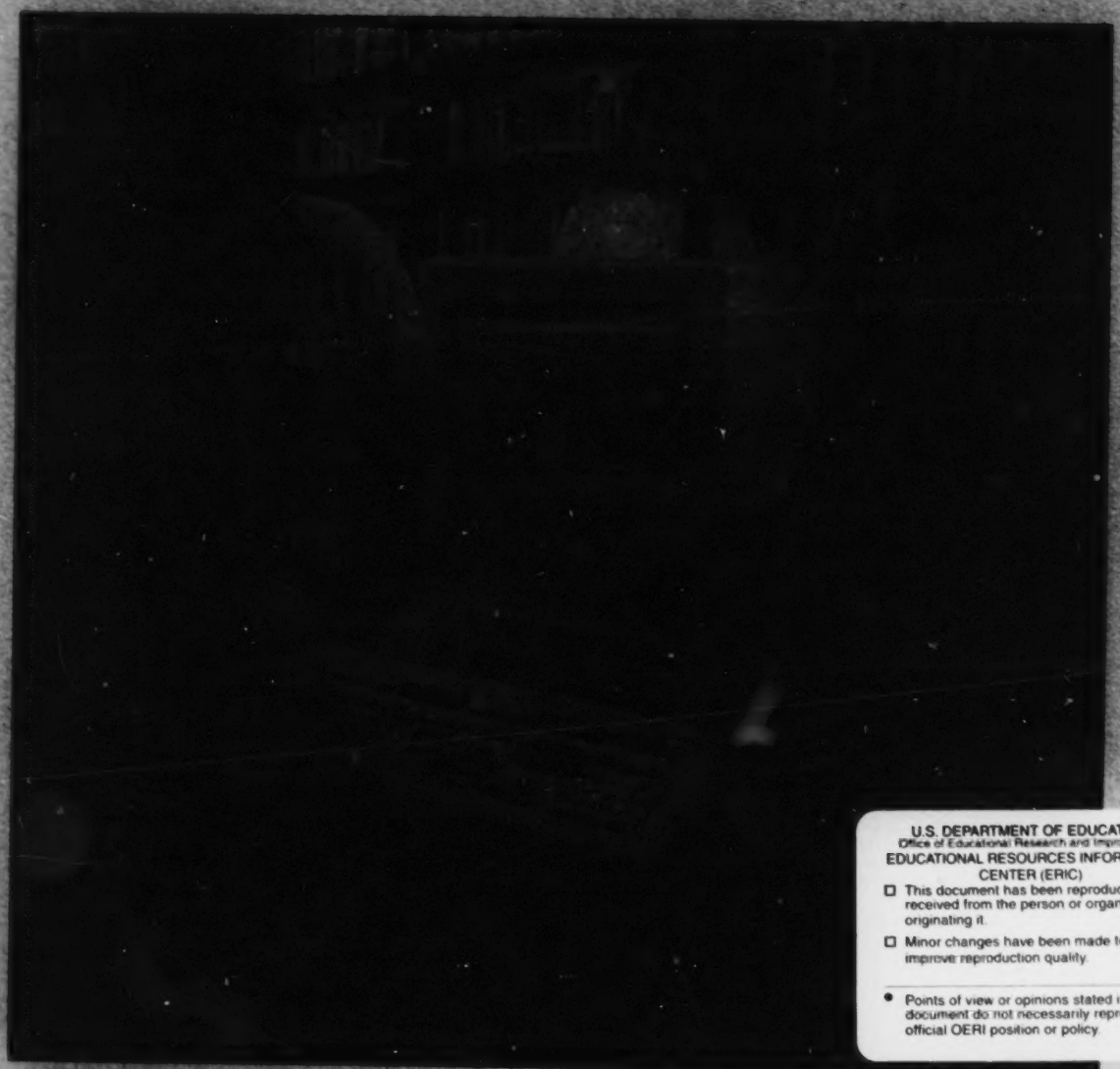

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In This Issue:

Learning With CD-ROM and Videodisc Programs

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In This Issue

Trudy Abramson

Inside These Pages

Volume 6, numbers 1 and 2 begins a new era in *HyperNexus* with a new Editor-in-Chief introduced in volume 5, three contributing editors introduced below, and a new ISTE publications coordinator, Jennifer Roland. We continue the use of screen prints to enhance the printed words, introduce a letters column, and keep our coverage of hypermedia and multimedia hardware and software broad. It is hoped that we are now working on schedule and that this will be the last combined issue.

The messages from the SIG Chairperson and from the Editor-in-Chief look to the 21st century; both invite our readers to help create this not-to-distant future.

Monique Manuel and Min Liu describe the use of a videodisc, *The Jungle Book*, to teach spatial relationships to five year olds.

Manoj Patankar presents a comprehensive analysis of a two-disk CD-ROM, *Learn to Speak Spanish*, a highly-interactive, multimedia learning package that includes a text/workbook and a user guide.

James Beal, whose *LinkWay*-based Civil War project was featured in the previous volume, shares a wealth of *LinkWay* shortcuts and tips based upon using the software with his pupils.

Paola Williams, SIG Chairperson, continues her column on the World Wide Web, an Internet resource that has made possible the transmission of multimedia documents.

George Fornshell introduces *Adobe Acrobat*, a product that allows graphics and text documents to be distributed over electronic media without consideration of the platform used to create them or the platform used to receive them.

Linda Martyr and Valerie Prigaro present the last of the how-to *HyperCard* tutorial series. Their work is followed by a stack, *The Pond*, authored by Linda.

At last, *HyperNexus* has received some mail. The long-anticipated Letters column features three readers.

Contributing Editors

A glance at the masthead reveals that *HyperNexus* is growing in scope and professionalism. With pleasure, we introduce our contributing editors.

George K. Fornshell, PhD

George is an Associate Professor, School of Computer and Information Sciences, Nova Southeastern University, Ft. Lauderdale, FL. He has joined our board as contributing editor in charge of new hardware, software, and netware products. His career in education began in the classroom in Dade County School District in Florida. After six years of teaching and completion of a Masters degree in Guidance and Counseling, he moved on to be a guidance counselor in elementary and middle schools. In 1987, he obtained his PhD in Training and Learning at Nova University and joined the University as Director of Telecommunications and Technology. Since that time, he has moved on to be Director of Online Doctoral Programs and Associate Professor at his present affiliation. George is both an advocate and a connoisseur of high-tech innovations in learning and training. gforn@alpha.acast.nova.edu

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Paola Williams

Paola Williams, HyperSIG Chair, is a computer education/social studies teacher at Punahou School, Honolulu, Hawaii, with a student population of 3,700, one of the largest K–12 schools in the United States. She is on the boards of the Association for Interactive Multimedia Hawaii (Aim Hi) and the Hawaii Network for Education in Science (Hi Nest). Paola is an active presenter at conferences and workshops. She was appointed by the Governor of Hawaii to the Hawaii State Goals 2000 Panel, and has worked with its support group for technology planning. She is very involved in school reform with an emphasis on the roles of technology in restructuring education. Paola is our contributing editor for K–12 hypermedia/multimedia classroom productions; she authors a column, "Web Wanderings," and prepares a SIG message as Chairperson. pwilliam@lava.net

A mind is a fire to be kindled,
not a vessel to be filled.
—*Plutarch*

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A Vision Statement for the 21st Century

Paola Williams

"Vision," as defined by the Random House College Dictionary states the "power of anticipating that which will or may come to be ..."

A vision of education that embraces technology is based on that premise of what "will or may come to be" for all learners, whether they are five years old and entering a formal education for the first time, or they are 80 years old and mentoring a teen or acting as a surrogate grandparent for a preschooler.

The students in the kindergarten class of 2000 will be born by the end of 1995. What do the guardians of this 1995 kindergartner class have in common? They will determine the quality of education these yet to be born kindergartners will experience.

What about the graduating class of 2000? What will college demand of these learners? Will it be necessary or even desirable for all high school students to go to college?

What will those entering the 13–17 years of formal schooling learn? What will they be able to do, think, decide? What type of measurement tool will be in place to convey an individuals' level of creativity and how will we judge their proficiency? What will we value and require of a well-educated, informed citizen. What will we look for in our elected officials? What will we mean by "teacher"? Will all adults, children, and media educate, entertain, and empower our children and engage their minds? What will determine the qualifications of a "teacher"? What will we require students on exiting "formal school" to know and be able to do?

When do we implement our vision: today, tomorrow, or yesterday? When will know if we have been successful? Or when we have failed? When will the classroom of tomorrow be ready for our children of today? When will teachers have enough time to add "one more thing"? When will decisions about teaching and learning be left up to the stakeholders? When will government, community, and business support our greatest assets—our children?

These questions belie the answers because they imply that all of our talk is just that—talk unless we take action.

The classroom, the environment of school, as we know it from our own past must change. Fundamental shifts in how we view the institution of education must change in order for learning to be lifelong and engaging to all learners of all ages.

The concept of school must change. School will exist in all places and times where learning occurs. Classmates will be those next to you in an assembly of learners, or thousands of miles away sharing time in a distance educational experience via cable, telephone and video. Community will take the place of school and communities of learners will share ideas and expertise as they pose questions for experts and mentors to discuss, analyze, and synthesize. There may not be right answers, but good ideas and alternative solutions. Good ideas and creative solutions will be valued because of their thoughtfulness.

If we want our students to be the best and the brightest, to come from schools that "break the mold," Americans must buy into to the notion of education at all cost. Not just monetarily, but emotionally, morally, and with value. We must value the institution and embrace it through our culture. When we value our institutions, and place high regard for their well being, we value those that serve those institutions. Children and adults must look to the profession of teaching as one that is filled with integrity, honesty, and fostering habits of the heart. Teachers must see themselves as worthy, and valued. The notions that "those that can't—teach" and "I'm only a teacher" must be replaced with positive statements that identify a profession that is valued by its own populace.

Over the last few months, many conversations have taken place over miles of cable and via satellite links to educators around the globe about topics that reflect our work in educational reform and particularly the role of technology in these changing times. It is important that you add your voice to this dialogue. Talk to other teachers, your principal, your dean, and share your voice in the vision of what school and learning should be all about. Write an article for *HyperNexus*, present at a local or national conference, attend a conference in a different area then your own. Find out what others think and begin this important conversation.

Hope you find this edition of *HyperNexus* informative and valuable. Please share it with someone.

aloha

Paola Williams
Chair, HyperSIG 1995–1996

Keys to the Future

Trudy Abramson

Recent History

Thirty years ago, closed-circuit television was used for inservice training and instructional TV was in its infancy. Film, as an aid to instruction was a special for which several classes were brought into the school auditorium. Educational television broadcasting proliferated and the large screen televisions-on-a-cart gave way to the installation of classroom-based sets. Shortly after videotape became a natural concomitant of TV in homes, producers began creating videotapes for education and VCRs were set up alongside the classroom TVs. This technology provided imagery, sound and motion but it was one-way; the students were passive receivers. It was up to the classroom teacher to devise ways of turning these shows into active learning resources.

During these same three decades, computing technology in the classroom matured from expensive, limited, and prototype to affordable, open-ended, polished tools and products. Today's school computers embody digital imagery, sound, motion, and connectivity to the world. Through online and CD-ROM resources, a classroom is a library, a museum, and a science laboratory. One key to the effectiveness of these resources is the time the student is actively involved in the learning process.

HyperSIG

Educators, at all levels, who use hypermedia/multimedia as student-development tools hold many keys to the future of education and the future of productive citizenry. HyperSIG, ISTE's special interest group in hypermedia and multimedia that publishes this journal, has slightly more than 1,000 members. There are many more than one million teachers in the United States making us, the bearers of learning for tomorrow, statistically nonsignificant. The subgroup of educators who have organized to recognize the reality and potentials of authoring tools and products represents fewer that one-tenth of one percent of the greater group. [There are parallel SIGs sponsored by other organization. Their memberships, also, are small and overlap with ours.] Within these pages, we have the opportunity to share the manifold aspects of hypermedia and multimedia in learning, to reach out to the greater community.

Technology in the Schools

On occasion, I am invited to visit a dynamic, highly functioning, technology-based learning environment who silently celebrate their successes. If yours is one of these well-kept secrets, I urge you to share your triumphs and travails, your successes and failures, your hopes and dreams. This will allow others to model, to cut and paste, and to venture forth with peer support.

Last month I had the pleasure to take part in the National School Board Association (NSBA) Conference in Atlanta, GA. It was a splendid event: the place was alive with hardware, software, and netware. Issues addressed in the sessions included selection, funding, wiring, staffing, grants, teacher training, and the problems related to the integration of technology into the curriculum. The last issue, really the *raison d'être* for everything else, has been around for almost two decades but doesn't seem to get answered satisfactorily enough for widespread dissemination. Are there really model programs that integrate technology in the active learning process that can be affordably replicated in classrooms across the country? Do these programs prepare students for society better than any pre-technology solutions? [If yes, which society?] How do we know? How many classes can a scientist "talk to" online and still fulfill the job requirements?

Needs Before Curriculum

Children of 10 years of age speak with younger ones about how things were different when they (the 10s) were little. Society is changing rapidly based upon technology innovation; work and home are no longer separate and distinct entities for many people. We need to prepare our students for the world they will enter as adults when we do not know what that world will be. Curriculum content beyond the agreed-upon basic skills must change. To use today's tools on yesterday's curriculum will probably not meet the needs of tomorrow. Nevertheless, we who are experimenting with hypermedia and multimedia tools are moving in a positive direction and must step forth into the public domain. I urge each of our readers who believes that learning takes place best in a collaborative, constructive, technology-supported environment to take a small first step for the sake of the common good. Send *HyperNexus* a photograph, a screen dump, a question, comment, or letter. Contribute to our keys to the future.

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The Use of Interactive Videodisc in Early Childhood Education: An Example

Monique Manuel and Min Liu

Computer Use in Early Childhood Education

The role of computers in early childhood education is of critical importance as we prepare our children to develop the skills that will be necessary to be productive citizens and capable of entering the work force in the 21st century. Although some teachers of young children feel that the introduction of technology to the lower grades, kindergarten, and prekindergarten will hamper the developmental appropriateness of their curriculum since computers are more abstract and only two dimensional, it was found in a questionnaire study that 91% of the parents polled and 80% of the teachers polled thought computers were appropriate for 3–5 years old (Guddemi & Fite, 1991).

Computers are becoming more prevalent in early childhood programs. More than 25% of licensed preschools had computers as early as 1984 (Clements & Nastasi, 1993). The ratio of computers to students has decreased from 1:125 in 1984 to 1:22 in 1990 (Clements & Nastasi, 1993). Computers have been reported to aid in the development of language, motor skills, social-emotional growth, and cognitive growth (Haugland & Shade, 1988; Wright, Shade, Thouvenelle, & Davidson, 1989; Wright & Shade, 1994).

Language Development

Computer graphics programs can be used to enhance language development and encourage verbal expression as children create and often narrate what appears on the screen. Young children have successfully used computers for word processing in emerging literacy programs (Guddemi & Fite, 1991). Emerging literate children are capable of seeing words printed on paper with printers empowering them to create letters and words independently (Wright et al., 1989). Children who write more with computers, as their skills advance, are likely to take increased pride and confidence in their writing. They have fewer fine motor control problems, and are more willing to take risks and revise, and build a sense of competence. Furthermore, the visual and auditory capabilities can be used to motivate children and allow nonreaders to use the computer more autonomously.

Motor Skill Development

The use of keyboards calls for precision and careful hand motions. This increases awareness of cause and effect so as not to hit more than one key or hold one down for too long. Controlling a mouse or a joystick adds a degree of precision. Literature has suggested that fine motor skills can be heightened through the use of a keyboard, mouse, joystick, or touch window (Wright et al., 1989). Gross motor skills are exhibited in such programs as *Panda Workout: How to Weigh an Elephant*. This program encourages large muscle development as children design an exercise program with pictures and then exercise along with the music included. Not only are they exercising body parts but learning the names as well (Wright et al., 1989).

Social-Emotional and Cognitive Developments

Computers are seen to be tools to increase children's self-esteem and attitudes through working in a group on a computer program, solving a math problem together, or writing using a word processor. Because computer skills are perceived to be valuable in schools and workplaces, knowing how to use computers often makes children feel good about themselves. Along with social-emotional development, the early childhood curriculum fosters cognitive development, which can be assisted with the use of computers. Cognitive growth is much broader than acquiring skills such as counting, identifying shapes and colors, and matching and sorting objects. It includes exploring objects and materials to understand their properties, seeing the predictability of cause and effect relationships, and identifying consequences.

Papert's microworlds have been shown effective in assisting the cognitive development for children as young as three years old (Haugland & Shade, 1988). Symbolic representation is another important aspect of cognition in early childhood, because it is a part of one's ability to know his or her world, the ability to create symbols that allow humans to become familiar with their environment and to communicate their knowledge (Escobedo & Bhargava, 1991). Studies have

shown that computer-generated graphics can assist young children in developing symbolic representations (Escobedo & Bhargava, 1991).

Computers clearly have potential to support children in all stages of development. To ensure that computers will have a positive impact on children, it is vital that children have easy access to computers and appropriate software is selected for the targeted age groups. More importantly, necessary training must be provided to the teachers so that they will be able to incorporate technology into their own teaching practice.

An Interactive Videodisc Program for Kindergartners

Computers are becoming more accessible to the schools. Because of the increase in curriculum topics on videodiscs and the decrease in hardware prices, many schools now own at least one videodisc player. The number of videodisc players in schools has increased from 43,000 in 1987–1988 school year (Helsel, 1988) to 200,000 for the present (L.I.N.K. Resources, 1994), and is continually growing. Literature has shown that videodisc technology has been used with elementary and high school students. However, its effect has yet to be fully researched (Liedtke, 1993; Etchison, 1994). Research by Steinburg (1990) reported that audiences retain 20 percent of information they hear, 40 percent of what they see and 60–70 percent with which they interact (Lidetke, 1993). Thus when multimedia is used in education and training, classroom productivity is reportedly increased through a reduction of instructor dependency, enhanced consistency, stimulated learning processes, and improved retention due to increased student interactivity with the system (Liedtke, 1993). Little use of such technology is found in early childhood education. Is such technology developmentally appropriate for younger children? Can young children handle this technology?

In an attempt to address these issues, a *HyperCard*-based program was developed using the videodisc *The Jungle Book* to teach the concepts of spatial relationships to the kindergarten-age children. The spatial relationship is a topic addressed in the curriculum for this age level. Using the videodisc, four paired topics (up/down, in/out, front/behind, and above/below) are presented through one of the children's favorite stories, *The Jungle Book*.

Various media such as text, graphics, audio, and video are used in the program. When a child opens the program, a main menu with four pictures representing the four pairs of concepts and a picture of the character Bagheera will appear (see Figure 1). Bagheera is a black talking panther, a main character in the story. When the child clicks on Bagheera, the direction of how to proceed will be given orally. The child can then select the picture that represents any pair of the concepts to begin the activities.

There are four video clips from *The Jungle Book* story to illustrate each concept. For example, if the child selects the "up/down" concept, she can view the video clips illustrating this concept as many times as she would like (see Figure 2). A practice activity follows this viewing of the video clips to see if the child understands the concept. The child proceeds to the practice activity by clicking on an icon of a hand pointing to the right. A screen will appear with color pictures showing the "up" movement and the "down" movement (see Figure 3). If the picture showing the direction "up" is selected, the word "up" will flash above the picture and a voice will say "Up!, here the elephant's trunk is up." Text and audio are used here to reinforce the concept.

Because the target audience is five-year-old children, text is used minimally in the program. The spatial relationship concepts are presented through video and color graphics, rather than the text. Directions and feedback are given orally. Music from the story is used as a motivation device in the beginning of the program. The character Bagheera is available on all screens to give directions orally so that a child can identify him as a help button. The hot spots (buttons) on the screens are purposely designed to be big so that the young children, with limited motor skill development, can easily locate and select them. Children can concentrate on learning the spatial relationships by interacting with the computer at their own pace and through their own control. This program was designed to teach children the concepts of spatial relationships in a fun and motivating way.

Pilot Testing

To find out how kindergarten children respond to this program, this program was pilot-tested by three five-year-old children. Two were Hispanic, one male and one female, and one was a male Vietnamese enrolled

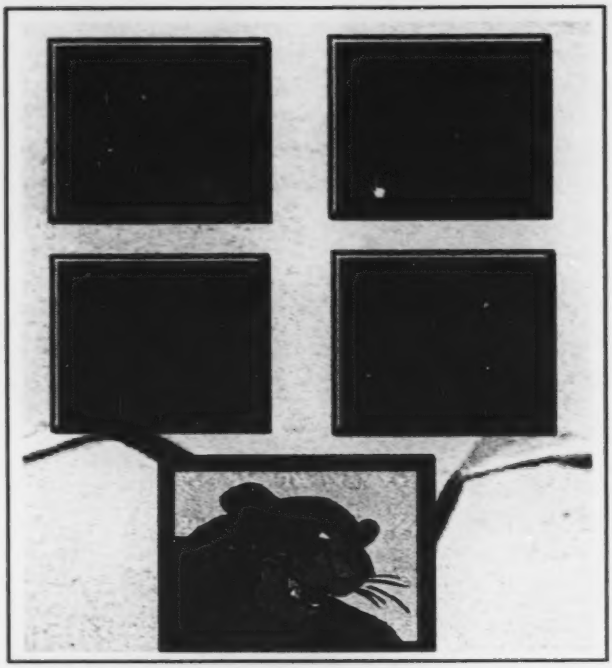

Figure 1. Main menu

Figure 2. Illustrating the concepts of up and down using the video clips from The Jungle Book

in a 1994 summer remediation program geared at enhancing their basic skills knowledge in English before entering the first grade. Based upon the test scores used at the kindergarten level, these children were classified to be of high ability (the Hispanic male child), medium ability (the Vietnamese male child), and low ability (the Hispanic female child). All three children had used computers with a mouse before this pilot test; however, none had used a videodisc player or a computer controlling the videodisc player. They were given the same instructions of how to use the program and they were told that clicking on Bagheera would give them directions for each screen. Observations were made of the three children during their use of the program. Each child tried out and completed all four activities individually. The children were given the opportunity to ask questions during the use of the program if needed.

After their use of the program, the children were asked six attitudinal questions (Shyu & Brown, 1992). The questions addressed whether the instruction was clear and the program was easy to use, whether the program helped them to learn, if they liked the color pictures and sound, and if they enjoyed the experience and would participate in another interactive video learning activity. All three children said they enjoyed using the program and viewing the related video clips from the story. They said the directions were clear and the program was easy to use. The two boys said that they learned concepts "in front of," "below," and "above" from the program while the girl said she did not learn anything from the program. All three children said they would like to participate in a different interactive videodisc learning activity in the future.

Based upon the observations, it appeared the children enjoyed the graphics, the movement in the video, and the sound. At times, they smiled and laughed, and

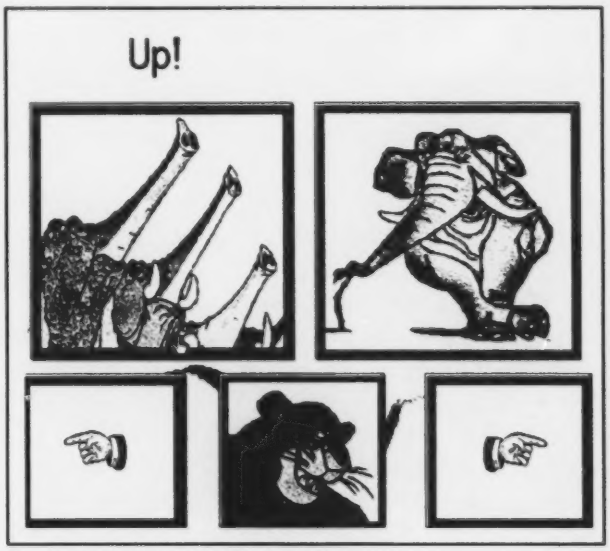

Figure 3. The practice activity for up and down

the boys tapped their feet to the beat of the music. The children readily clicked the appropriate buttons using a mouse to listen to the directions and/or feedback, and watch the video. The boys asked similar questions in the beginning of the program as to whether they had selected the appropriate buttons, but they quickly became independently throughout the rest of the program. The girl appeared to have more problems in understanding the explanations in English. The directions had to be restated several times for her. However, she was able to complete the program.

Implications for Preservice and Inservice Teachers

Children of today are a generation that grows up with television, video games, and computers. Computers are a part of their life. Unlike many adults, these children have little computer anxiety and are more accustomed to explore and discover when they are placed in front of the computers. This pilot test indicated that the three children can use the videodisc technology without difficulty. If the digital voice output had been in the native languages of these three children, we would anticipate fewer questions about the selection of the appropriate buttons. The multimedia aspect of the program proves to be an important factor to motivate children of this age. The fact that the concepts are taught in the context of a children's story and are illustrated through video clips appeared to be helpful in assisting the children to acquire the spatial relationship concepts.

To enhance children's learning through these types of programs, teachers themselves must be competent with the technology and capable of selecting the appropriate software for the children. Just as a teacher is trained to use manipulatives in mathematics or to perform experiments in science, teachers must also be trained in computer applications, particularly in how to integrate computer technology into the curriculum. If teachers begin to see that these computer applications support teaching in their own content areas, they are more likely to use these applications for a more meaningful purpose.

Videodisc technology has become readily available to teachers at affordable prices. Many videodisc publishing companies produce a large number of educational videodiscs. Increasingly we see more and more textbooks published with accompanying videodiscs and barcodes. Companies such as Pioneer have demonstrated their commitment to the use of videodiscs in education. Teachers should take advantage of this technology. Although the videodisc players are available in many schools, they are not used to their full potential because many teachers lack the knowledge of how to use them effectively. To prepare students of tomorrow and help a generation which is ready for this new technology, teachers must be trained in how to best integrate technology into the curriculum.

The use of many authoring languages, such as *HyperCard*, makes it possible for teachers to develop programs in their own content areas using the existing materials. The example demonstrated in this paper was developed by an inservice teacher. The same videodisc, *The Jungle Book*, can be repurposed to teach topics such as action verbs; adjectives; techniques of animation; mood as reflected by the music; essential and common knowledge, such as why people yawn; and so on. If teachers see a purpose in creating curriculum-related materials, they are more likely to have a desire to be trained and motivated to use these tools effectively. As teachers become aware of their ability to make their own programs and they have access to the variety of videodiscs, the development of rich curriculum resources to enhance learning is only limited by their imaginations. It is at this point the technology will have fulfilled its maximum educational value.

Videodisc Programs for Kindergartners and Elementary Students

There are numerous videodisc programs available for K–12 schools. Table 1 shows only some of those programs that can be used for children at kindergarten through elementary schools. Of course, the Disney stories are very appropriate for young children.

Table 1.

Company	Videodisc Title	Subject	Level	Grade Level	Description
AIMS Media 800/for-aims	*The Bear*	Language Arts	1	K-6	Based on Faulkner's story, the story follows a young boy on the annual hunt. Students learn about relationship with the wilderness.
Churchill Media 800/334-7380	*Morris Has a Cold*	Language Arts	1	K-3	Following the story of Morris, students learn about germs and how to take care of themselves.
Educational Activities 800/845-3739	*Children's Songs Around the World*	Music	1	K-6	Songs from many countries accompanied by scenes from each country.
Optical Data Co 800/524-2481	*Windows on Science*	History	1	K-6	Students explore people, places, and activities that are not part of their immediate world.
Video-discovery 800/548-3472	*Science Sleuths Elementary*	Science	1	K-6	Students solve mysteries related to science.

Source: *Media & Methods*, May/June 1985

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Learn to Speak Spanish: A Case Study

Manoj S. Patankar

Title:	*Learn to Speak Spanish*
Year:	Spring 1995 Edition, v5.0
Publisher:	HyperGlot Software Company, 314 Erin Drive, Knoxville, TN 37919
Price:	$119.95 + Tax
Platform:	Macintosh or *Windows 3.1* (or higher)
Hardware:	Macintosh Hardware—68030/25 MHz or better; System 7.0.1 or higher; hard drive; CD-ROM drive (double speed highly recommended); 256 color monitor; MacRecorder or microphone. *Windows*/MPC Hardware—80386 DX/33 MHz or better; 4MB (8MB highly recommended); VGA monitor; MS-DOS or PC-DOS v5.0 or higher; *Windows 3.1* or higher running in 256 colors; hard drive; CD-ROM drive (double speed highly recommended); MPC-compatible sound card; microphone (optional but highly recommended).
Classification:	A complete learning package that includes tutorial, drill, game, and test
Domain:	Students, business people, and tourists in a self-study environment
Subject Area:	Foreign Language Instruction—Spanish
Age Range:	12 years and above
Reading Level:	5th grade (minimum)

Introduction

Learn to Speak Spanish, by HyperGlot Software Company, is a highly interactive foreign language learning package designed for students, business people, and tourists. It has integrated the traditional textbook with the computer, taking advantage of their individual strengths. Although the software and the textbook could be used separately, each has its own special features. The textbook explains the grammar, whereas the computer incorporates audio and *QuickTime* movie files enabling the learner to hear and see native speakers. In spite of a few minor design flaws, the software is quite a step forward from typical audio/video tapes of programmed instruction. This software motivates the learner to pay attention to detail; understand the grammar, pronunciation, and meaning of every word in the vocabulary, prior to proceeding with the exercises included within each lesson. Since the software has high cognitive interactivity, it is very demanding, thorough, and effective.

Multimedia is a unique tool in the field of instruction because it presents the benefits of text, graphics, and audio in an interactive form. Consequently, it has the potential to make learning individualized, interactive, and interesting, and to have all students achieve mastery (Bork, 1992). However, for multimedia to be effective in instruction, the design of multimedia-based courseware must conform to the norms of instructional design as well as media design. This review is to examine the integration of instructional design principles with media design principles to produce an effective learning package.

Installation

Learn to Speak Spanish is delivered on two CD-ROMs and is supplemented by a text/workbook and a user guide. Anyone who has installed *Windows* software before should be able to install this software without any difficulty. Its setup program verifies your system configuration and alerts you if any discrepancies exist. I encountered the following "faults": keyboard layout, language, and *QuickTime* version. Once a fault is highlighted with arrow keys, a more detailed explanation and significance of the error message is displayed in an adjoining box. Information in the README file contains all the helpful hints you will need to work out any installation problems you might encounter. Once the actual installation begins, you get three choices: minimum install, medium install, and maximum install. The differences are in access speeds and hard disk space consumed. Since the original software came on two CD-ROMs and I had only 40 MB remaining on my hard disk, I chose the default setting of minimum installation (it takes over 45 MB per lesson if you want to do the maximum installation). The user guide suggests to use medium or maximum installations for increased response time. This response

time could only be a problem when playing movie files: the graphics and the audio tend to lose mutual synchronization.

Course Architecture

Attention is prerequisite to learning (Gagne and Briggs 1979). On start-up, the software displays a beautiful map of Mexico and then as it highlights the tourist spots, it shows beautiful photographs of these places. The software is truly designed from a tourist's perspective. Also, the Mexican soundtrack in the background is impressive. The whole presentation is designed to immerse the learner in the right environment. It works. Figure 1 shows the orientation screen.

Figure 1.

The Table of Contents lists lessons along with small photographic icons related to the subject covered by the lessons. The table also list movies at appropriate intervals. These movies contain short *QuickTime* video clips with a narration that uses vocabulary introduced in the previous lessons. One of the most useful features during this movie presentation is the provision of English transcripts of the narration. It is quite convenient to glance at the translation if the Spanish version is not understandable.

On entering any lesson, the objectives of that lesson are clearly specified; they are displayed as text and narrated. Each lesson begins with a module on vocabulary, then proceeds with a story module, then an action module, and concludes with many exercises. Figure 2 shows the flow chart that a learner should follow to benefit the greatest. The vocabulary module

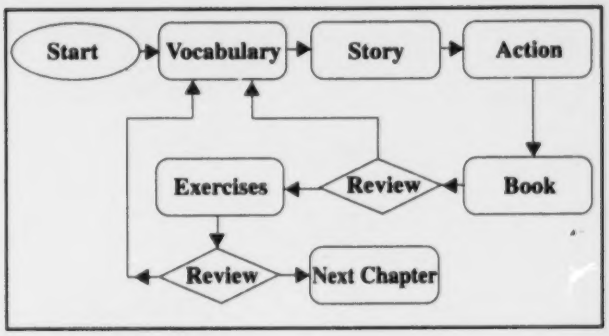

Figure 2. Lesson flow chart

contains a list of words, their pronunciations, their use in a typical sentence, notes on grammar, and a record player. The record player allows the user to record his/her pronunciation of the word that he/she heard earlier. This allows the user to compare the two pronunciations, one by the native speaker and the other by him/herself. Each word is also associated with a simple sketch that learners could use as a memory aid.

The story module (see Figure 3) is a short piece of text that describes a situation. During this aural description, the learner can view its transcripts in Spanish or English. The action module on the other hand, uses the same vocabulary to illustrate dialogues between native speaker(s) and a tourist. The story and action modules allow the learner to observe application of his/her newly learned vocabulary and enhance his/her listening comprehension.

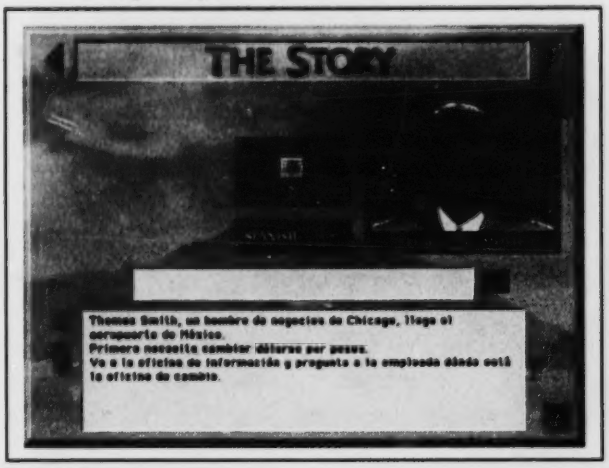
THE STORY
Thomas Smith, un hombre de negocios de Chicago, llega al aeropuerto de México.
Primero necesita cambiar dólares por pesos.
Va a la oficina de información y pregunta a la empleada dónde está la oficina de cambio.

Figure 3.

Next, the learner should go to the text/workbook. This step cannot be overemphasized because success with the exercise modules that follow depends on the mastery of the material presented thus far.

The exercises test the learner's vocabulary, grammar, sentence construction skills, listening comprehension, and pronunciation. They are very thorough and are essential to ensure success with the learning package.

Computing Issues

"A good courseware provides extensive hyperlinking to enable discovery learning, but a better courseware guides the student during this experience along a predetermined path without arousing any suspicion" (Rosenberg 1993, 369). This is a good courseware.

Interface is the screen which the end user is first exposed to, and it is this "window" that he/she uses to access information and navigate through the course. Since it brings all the elements of multimedia together, it should strive to present them effectively. This software does very well in presenting a consistent interface so that the users know where to look for a specific button. The screen is not at all cluttered with information; it provides a good clean interface. However, there are certain places in the software that the interface is deficient in its functionality. For example, when the learner is in the vocabulary module, there is no way of knowing whether he/she is in the vocabulary module of the first or second chapter. This could be regarded as much of an interface issue as a navigational issue. Also, if the learner wants to return to the table of contents from any of the modules within a chapter, the learner must click on the title bar of that module to reveal a button panel and then choose "Exit." The fact that he/she must click on the title bar is not clear; it is a secret to be discovered from the textbook or plain experimentation. Also the label "Exit" is ambiguous because it is not clear whether clicking on that button would exit the learner from that session of the software, returning him/her to the Program Manager or just get him/her out of that lesson and return him/her to the table of contents. In reality, it takes him/her back to the table of contents.

Alessi and Trollip (1985) have cautioned courseware designers to refrain from using video where it is not absolutely essential. Animation files are considerably smaller than video files and hence, it does not make sense to use full-motion video clips (or even *QuickTime* clips) unless they satisfy a very specific purpose that an inexpensive animation can not. The *QuickTime* clips available in the vocabulary modules serve only to prove that it can be done. The price of that feature, in terms of disk space, is not justifiable. It can be replaced by a simple animated "talking head" or a static photograph without losing the aesthetic appeal or instructional value. The *QuickTime* clips in the movie modules, however, serve a specific purpose of introducing the learner to the Mexican culture. This feature truly uses the computing power to create a virtual world around the learner and immerse him/her in it.

Another interface problem is with the "Help" icon. It simply labels the functions of all the buttons, but unless you have a VGA monitor with 256 colors, all you will see are black spots. Whether the monitor is capable of displaying 256 colors or not, the basic labels and instructions should not be affected. A mature user might not object to an "infrared" image of the map of Mexico instead of the true color image, but he/she will certainly object to the text color that merges with the background. Since the software is targeted toward business people and tourists, it is very important to test it on a color notebook with dual-scan display. Successful operation of the software on such a notebook will allow the users to carry it with them.

Instructional System Design principles as well as Gagne and Briggs regard feedback as an essential element of instruction (Davis et al. 1974). Feedback is especially important in computer-based instruction and can be provided at multiple levels. A computer-based learner needs two types of feedback: instructional and navigational. For example, in the vocabulary module when the learner records his/her pronunciation of a new word he should know whether his pronunciation is acceptable or not. This software leaves this vital decision up to the learner! For a person learning his/her first foreign language it is not easy to pay attention to pronunciation details and judge whether his/her pronunciation is acceptable. With the computing power available it should be quite possible to compare two audio files and assign a correlation factor. Investment of programming/disk space in this feature would be much more valuable than the *QuickTime* clips of natives in the vocabulary module.

Conclusions

The software is effective in teaching to speak Spanish, however, its efficiency could be improved. The soft-

ware contains extensive use of audio and graphic files to immerse the learner in a "foreign" environment. The introduction to Mexico is a typical marketing presentation but works well. Each lesson is structured in a predictable sequence ultimately aimed at building vocabulary and developing grammatical skills.

The articulation of text/workbook with the software must be restated somewhere in the software itself. The text/workbook, in this case, is an essential element of the instruction package and not a troubleshooting guide. In the current state, it is likely to be used as a troubleshooting guide. By replacing the *QuickTime* clips in vocabulary, story, and action modules with some real instructional capability the overall efficiency of the software would be greatly enhanced.

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LinkWay Shortcuts and Tips

James W. Beal

The newer versions of *LinkWay* provide more features and, in general, are easier to use. However, many school districts find it financially difficult to upgrade their software. In addition, many districts cannot afford the peripherals that *LinkWay* supports. Below is a collection of shortcuts and tips that should make using *LinkWay* a little easier. These ideas were developed as a result of efforts to teach and integrate *LinkWay* into a junior high curriculum.

Object/Picture Alignment (MCGA mode)

Have you ever had a problem with trying to align buttons that overlay a picture in the MCGA mode? It does not take long to realize that objects, such as buttons, are placed on the screen via a grid system that does not always match the pixel-based *LinkWay* pictures. Here are a few ways to solve that problem.

First, try LWPAINT's grid system. You can activate this by selecting "GRID" under the "OPTIONS" menu. A grid will appear as a temporary overlay on your picture.

This will give you an idea where objects will be aligned when the picture is incorporated into a folder. Unfortunately, the fact that the grid is temporary (it disappears at the first movement of the mouse) makes it inconvenient to use in lining things up; However, there are a few ways around this problem.

One idea is to load LWCAPTUR before you load LWPAINT. Once you have loaded LWPAINT, begin a new picture and select the grid option as described above. Once the grid appears, press the SHIFT - PRINT SCREEN key combination to capture the screen. Save the captured file under an appropriate name (e.g., GRID.PCM). You now have a grid template that will not disappear when you make your drawings. The disadvantage is that when you use this template to start a new picture, the grid becomes part of a picture itself and must be erased. This problem can be dealt with more effectively if you take the time to fill in the one pixel that is missing at each intersection of grid lines. Once this is done you can use the FILL option to change the color of the entire grid or to effectively delete it from the picture (see Figure 1).

This solution works quite well with any students that may have a difficult time of visualizing the abstract idea of the grid system of alignment.

The captured grid picture can also be used as an alignment tool in a folder. By placing the GRID.PCM picture on the base page, students can more readily see how objects can be aligned.

Another method of getting objects aligned correctly is to load LWCAPTUR and then your folder. Go to the page on which you wish to align your pictures, fields, and buttons. Place all the buttons and fields on the screen in the manner and position you wish to have them. Use the BOX feature under the PAGE menu to outline invisible buttons or fields that do not have any text. Next use LWCAPTUR to capture the screen and save it as a picture file (see Figure 2). Leave *LinkWay* and load LWPAINT and the picture you just captured.

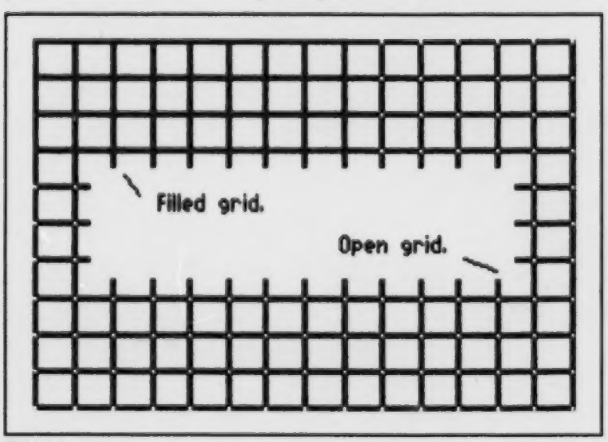


Figure 1.

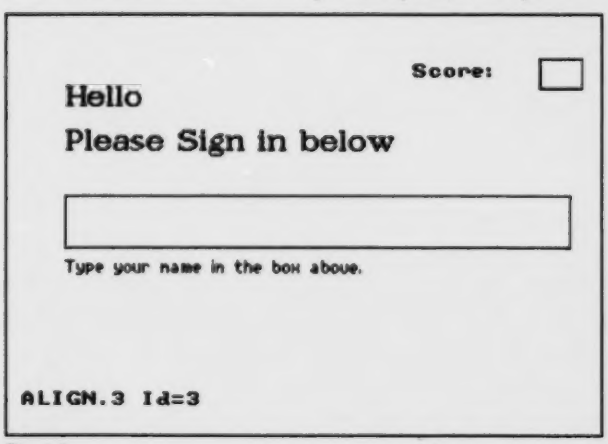


Figure 2.

Now you can draw your picture around all the objects. You need not keep all the boxes you drew around objects; they can be deleted as their necessity diminishes and your picture nears completion.

Full Screen Animation

Since *LinkWay* builds its pages in the order in which each object is created, students can create full screen animation by putting full screen pictures on the page in the order in which they wish to have them appear. Start by having students create their animation frames as full-sized LWPAINT pictures. Once this is complete, these pictures are put on the page in the correct animation sequence. Be sure to use pictures that cover the whole screen so as to avoid any unwanted flicker. Every time the page is brought up, the animation occurs, as *LinkWay* constructs the page, and stops on the last picture.

A good way to approach this is to start with animating a simple object such as a single ball on a black background. Once the initial ball has been drawn, it can be moved around on succeeding picture files by copying it to a new position and saving the picture under a new name. By repeating this 20 to 30 times, a student can create an effective animation segment.

Remember that when you are copying the object include enough background in the copy box to copy over the old image of the object (see Figure 3). Figure 4 shows a completed animation.

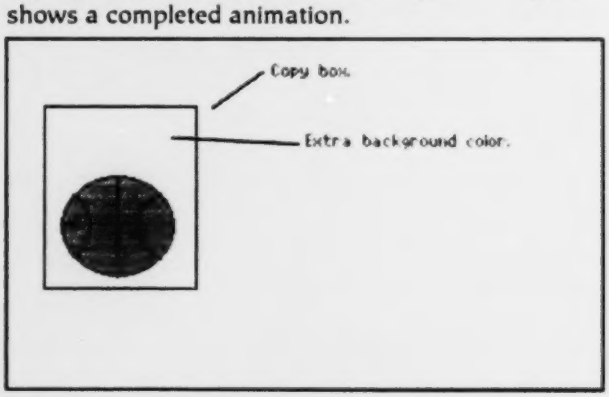


Figure 3.

The advantage to this method is that you can produce low-cost full-screen animation. For the novice teacher, this type of project familiarizes students with the use of LWPAINT, the sequence in which *LinkWay* builds a page, practice in placing picture objects on folder pages and an understanding and appreciation for how animation sequences are created. In addition, this important lesson, is easy for the novice *LinkWay* teacher to learn and teach. Since it is also time intensive, it can allow an instructor extra time to study the manual and stay ahead of his/her students.

The disadvantages of this animation system include the amount of disk space these images take, the difficulty in changing the sequence once all the pictures have been put in and that the animation speed is governed by the hardware used. In addition, the size of the folder must be watched, and the folder buffer size may have to be increased if there is an extensive use of this type of animation.

Capturing Pictures From CD's

When trying to capture a picture from a CD-ROM, one can run into a number of difficulties. First let us assume that the "legal" difficulty of copyright permission has been dispensed with either through a license, royalty-free pictures, or some other appropriate legal method. When students try to capture a picture from a CD by using the LWCAPTUR program, they often run into the difficulty since LWCAPTUR tries to save the captured picture to the CD-ROM without (of course) success. The solution is to type the drive letter of another drive (along with the file name) in the parenthesis that pop up at the top of the screen. This will force you to limit the filename size to less than 6 characters since LWCAPTUR allows only eight characters to be used in the parenthesis.

Sometimes pictures on CD-ROMs can only be accessed through software that utilizes *Microsoft Windows*. Unfortunately, LWCAPTUR does not work with *Windows*. A student may try to "Copy" a picture to the *Windows* Clipboard by pressing the "Print Screen" button. Instead of dumping the picture to the printer, the computer will dump it to the Clipboard. From there he/she could paste it into the *Windows'* Paintbrush program from which a PCX style picture could be saved. The PCX picture could then be run through the *LinkWay* Live's PCX conversion program. After all of this you may get something that resembles the original, or a new work of art! Actually, chances are that the color palette will be completely corrupted and the picture may look similar the original, but the colors will be completely different.

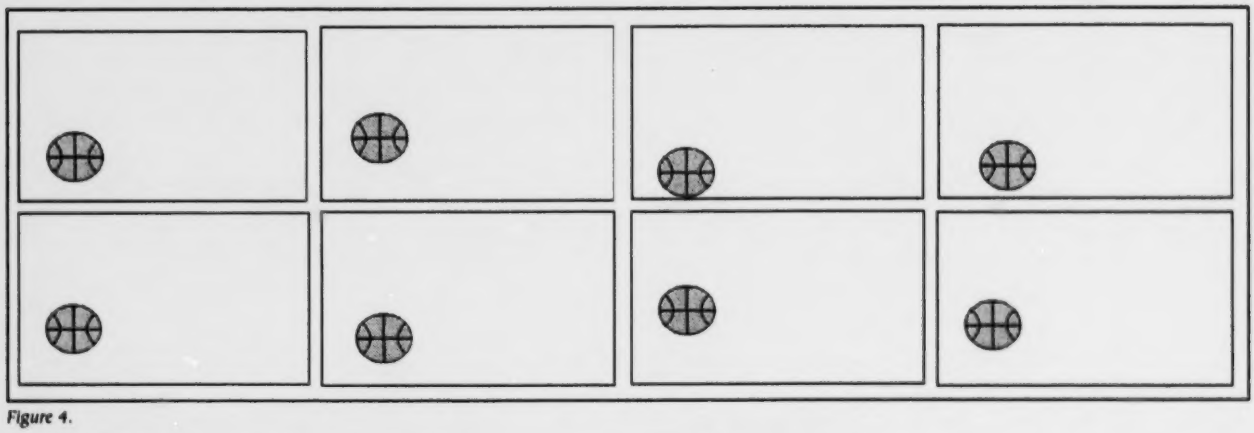


Figure 4.

Never Use Names on Internal Links

A good policy to follow when establishing links within a folder is to use only the page name and not the folder's name. If you do use folder names and you have to ever rename the folder, all of your internal links will become external ones since they will now link to a folder of a different name (see Figure 5).

Inexpensive Picture Digitization

You do not need fancy hardware to start utilizing pictures in *LinkWay*. When I first started working with *LinkWay*, I did not have the hardware needed to digitize pictures.

A few years ago, I had two students that were interested in digitizing a map of Illinois so that they could use it as a basis for their menu in their program. After encountering a number of compatibility problems with a borrowed scanner, I decided we could do it on our own. We took an outline map of Illinois and photocopied it to a transparency. My students cut the map out to fit the screen and taped it directly to the monitor. The transparency allowed them to look through the map and be able to copy it with LWPAINT. With a little patience and some perseverance they finished their work and created an award-winning program, at the state history fair (see Figure 6).

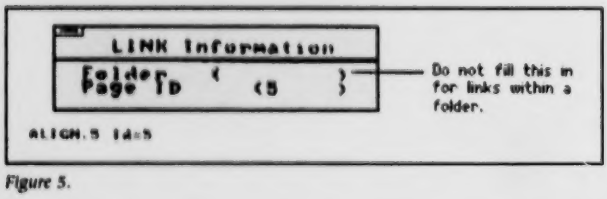


Figure 5.

Field Alignment

When placing text into fields, one should always align it with the upper left-hand corner so that when the filed is "moved and sized" the text alignment will remain unchanged (see Figure 7). Text alignment can also be preserved by making every effort to make the smallest and most compact fields possible.

Picture Alignment

When creating a picture, it is a good idea to align it with the upper left-hand corner of the window. This makes moving and sizing much easier.

Drawing a Button's "Hot Spot"

Always click and drag from the upper left- to the lower right-hand corner when you are creating buttons. This will ensure that the icon will match the button's "hot spot" that enables the computer to read the mouse clicks.

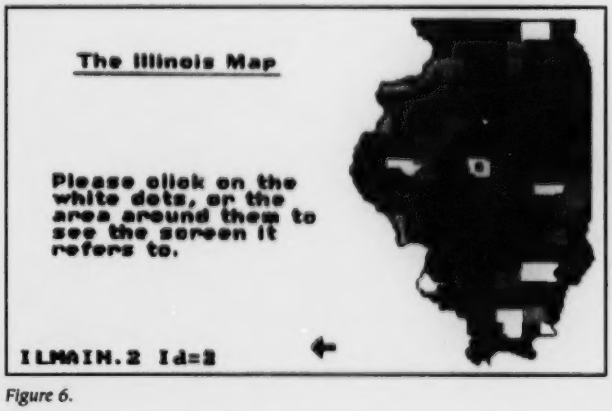


Figure 6.

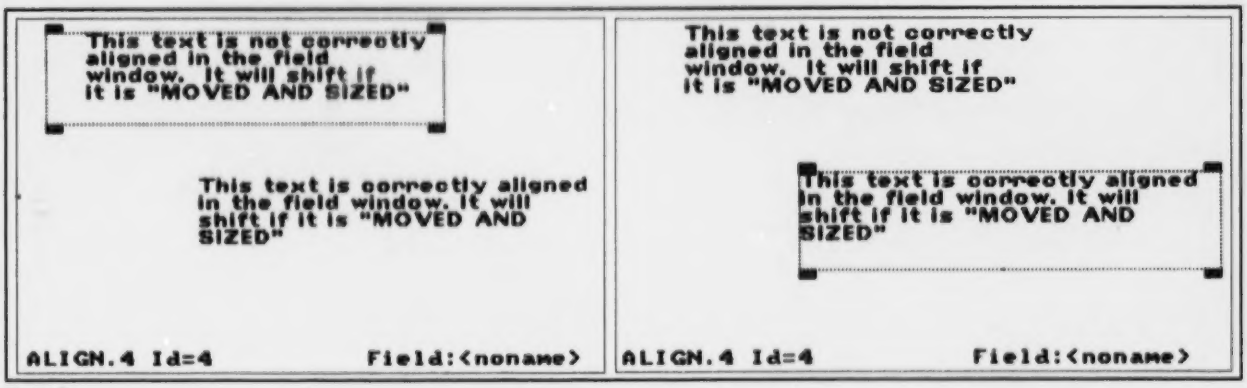

This text is not correctly aligned in the field window. It will shift if it is "MOVED AND SIZED"
This text is correctly aligned in the field window. It will shift if it is "MOVED AND SIZED"
ALIGN.4 Id=4
Field:<noname>
This text is not correctly aligned in the field window. It will shift if it is "MOVED AND SIZED"
This text is correctly aligned in the field window. It will shift if it is "MOVED AND SIZED"
ALIGN.4 Id=4
Field:<noname>

Figure 7.

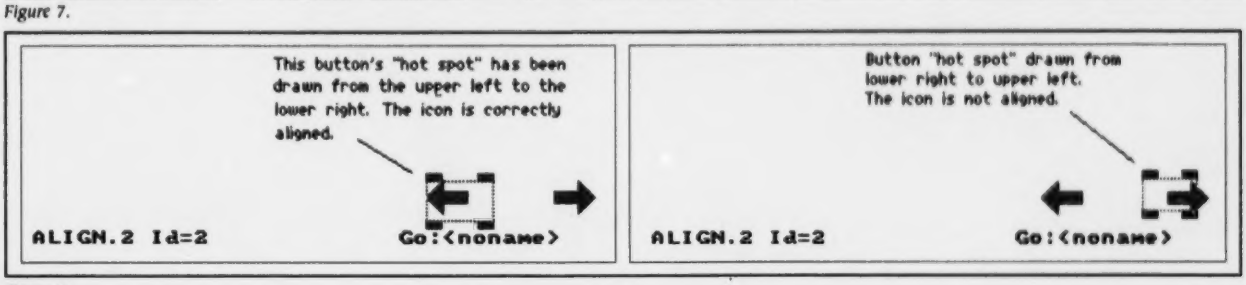

This button's "hot spot" has been drawn from the upper left to the lower right. The icon is correctly aligned.
ALIGN.2 Id=2
Go:<noname>
Button "hot spot" drawn from lower right to upper left. The icon is not aligned.
ALIGN.2 Id=2
Go:<noname>

Figure 8.

Base Page GO Buttons

During the application development phase, have students put a GO "next" button and a GO "previous" button on the base page (see Figure 9). This will allow them to page through their folder more easily when they are "authoring." After their folder is complete, these buttons can easily be deleted from the base page. The newest version of *LinkWay*, *Superlink*, has had this feature incorporated into its menu bar.

Figure 9.

Black is Not Black

There are two "blacks" on the color palette. The "black" on the top row, in the upper left-hand corner of the palette box, is not a black color. It is the background color and will not behave as a regular color. For example, it will not respond to a fade. All other "blacks" in a palette are black colors and will respond as such.

Conclusion

Although the newer versions may have more features and be easier to use, the older versions can still provided an enriched learning environment for your students. The more you and your students work with the program, the more alternatives all of you will discover.

***James W. Beal** teaches computer education and social studies in junior high school in rural, north central Illinois. He earned a MS Ed in instructional technology at Northern Illinois University where he is currently working on a doctorate in education. E-mail: jimbeal@delphi.com.*

Web Wanderings

Paola D. Williams

Last year we started with a column dealing with the Internet and how it was loosely associated with multimedia and therefore could be addressed by our journal. Within a short time span, the World Wide Web has made it clear that the marriage of voice, video and data is upon us and that multimedia travels throughout cyberspace.

It is therefore very logical that the editors and writers for *HyperNexus* would like to include the newest delivery system for multimedia in education, "the Web."

In a recent issue of *THE Journal-Technology Horizons in Education* (Volume 22, Number 11, June 1995), a definition of how teachers use the Internet emerges. In an article entitled "Observations from the Boulder Valley Internet Project," the authors discuss five ways teachers use the Internet. The first four remind me of the crawling to walking stage ... other metaphors comé to mind, using a horse and carriage to transverse the superhighway, and so on. The really creative and imaginative, the breakthrough idea, emerges in the fifth way that teachers might use this new tool. I'm not saying that teachers should not go through these initial steps, it is almost an imperative that they do. The real learning and innovation comes when the use of the "net" and it's "resources and tools transform curricula. When students do research as well as collaborative projects with other students on the network, becoming both consumers as well as providers of information." This is where a new empowerment emerges. Students have an ownership of their own learning and of developing essential skills for lifelong learning.

Examples of such projects have begun to surface over the last year. It is with pleasure that I share with you some of the newest and best offerings of student-generated Web locations that merge technology and content and that are student centered and student driven.

MidLink

(http://longwood.cs.ucf.edu/~MidLink/)

MidLink originated as an idea of the students and teachers of Discovery Middle School in Orlando, Florida.

In the short time of a year, the magazine as it is referred to rather than a homepage, has become the collaborative effort of middle school students worldwide. It is truly a cooperative project developed by middle schools students from the global community "with a little help from adults."

The motto of *MidLink* explains a lot about the guiding philosophy behind its production. "*MidLink* is created by kids, for kids. As expressed in the Franklin Museum's Electronic review "Caught in the Web," "colorful kid-produced graphics greet you on every page. There's an open invitation for students to participate." The key person behind this effort is Caroline McCullen, Telecommunications Teacher at Discovery Middle School. She originally envisioned *MidLink* as a place for students to publish and share their *HyperStudio* stacks. What emerged was a core group of teachers who were also trying to find ways to publish student work on the Web.

In *NetTeach News*, an article entitled "Networking and the Creative Arts" discusses creativity and knowledge building. "The global networks offer student creators the opportunity to share their creative expressions and works to a large and indeed global audience." What *MidLink* accomplished for student authors was a voice to that larger global community. In Caroline McCullen's own words, "We seem to be caught up in an infinite cycle of learning."

Myths and Legends of Indigenous Peoples

(http://www.ozemail.com.au:80/~reed/global/mythstor.html)

According to Barbara Twite, the Project Coordinator of this global project, their educational goals include developing students' appreciation of the literature of indigenous peoples in their own country and around the world. Another goal is to encourage students to look for common themes in stories, drawing conclusions from the shared experience about the needs and feelings of mankind in general. Ultimately, the educational goal includes providing tasks that are relevant to language arts, social education, geography, and history, by infusing the use of telecommunications and research skills.

Students participating in the project begin by reading and studying the literature of people in their own country, looking for common themes, and using the Internet to conduct research. Students then begin writing their own myths as well as interpreting existing myths. Students submit their stories via e-mail for worldwide publication. These pages are maintained by educators in Australia through OZMail. Myths and Legends was a global project featured in the May issue of *Classroom Connect*. Look for Hawaiian Legends in a future issue!

EarthKids Hawaii'i

(http://hookormo.aloha.net/epf/dsg/ekh/)

EarthKids Hawaii came out of Earth Day '95 Hawaii and an effort of the Hawaii community to share what children had to say about their environmental future. It is a continuing joint-venture project by kids and their parents from all over Hawaii. It's message is to share what kids have to say about the state of the environment. To become involved in EarthKids and have your community join, the contact is at env@aloha.net.

Hope this column has given you something to think about. For more examples of wonderful student generated web projects, contact the Franklin Institute at their web site, the address is: http://sln.fi.edu/tfi/welcome.html

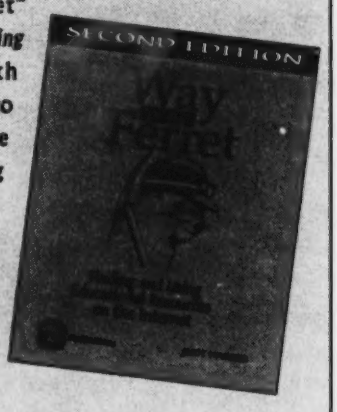
aloha...

THE RUSH IS ON!

Today, the mother lode of knowledge is the network of networks—the Internet.

In *Way of the Ferret—Finding Educational Resources on the Internet*, network explorer and guide Judi Harris shows you how to ferret out the information you need—original source documents, free and inexpensive software, up-to-the-minute news and discussions, cooperative classroom projects, and invaluable personal contacts. Learn to use information mining tools, including Telnet, FTP, and Gopher. Reach out to colleagues and remote classrooms through e-mail, listservs, and newsgroups.

More than a technical manual on telecommunications, *Way of the Ferret* is a guide to practical classroom and personal use of the Internet, presented with skill and humor by one of the most active authors in educational technology. *Way of the Ferret* is based on Judi Harris's "Mining the Internet" column in *The Computing Teacher* journal, with information updated to stay current with the constantly evolving Internet environment.



Order your copy of *Way of the Ferret*, and stake your claim to the information gold mine.

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World Wide Web: http://isteonline.uoregon.edu

As of November 1, 1995, ISTE's Area Code changed from 503 to 541.

The phrase "Mining the Internet" was borrowed with permission from Computing Services personnel at the University of California, Davis.

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Adobe Acrobat: The Universal Electronic Publishing Tool

George K. Fornshell

Introduction

After two decades of struggling with incompatible file formats, computer users working with a wide range of application can now share documents across Mac and PC platforms. For the first time, graphics and text documents may be distributed over electronic media including the World Wide Web, e-mail, and local area networks.

Adobe Acrobat, a product that contains two applications makes all this possible. The first product, *Acrobat Reader*, is an application that opens and displays Portable Document Format (PDF) files. The second program, *Adobe Exchange*, works with other applications on your PC system to print PDF files to disk. Normally, a user prints a spreadsheet, database report, word processor document, or flowchart using a printer. The *Adobe Acrobat* PDFWriter-On-DISK redirects the normal output from the printer into a PDF file. *Adobe Reader 2.1*, the newest reader version, enables users to view the file on screen as if it were a document printed on paper.

Overview

How does *Acrobat* work? Assuming that you have created a word processor document containing text with different fonts and bitmap graphics, the final step would be to print the file using a printer. *Acrobat Exchange Windows* users, however, print the file to disk using the PDFWriter-on-DISK driver. The resulting file would automatically be named with a PDF extension (see Figure 1).

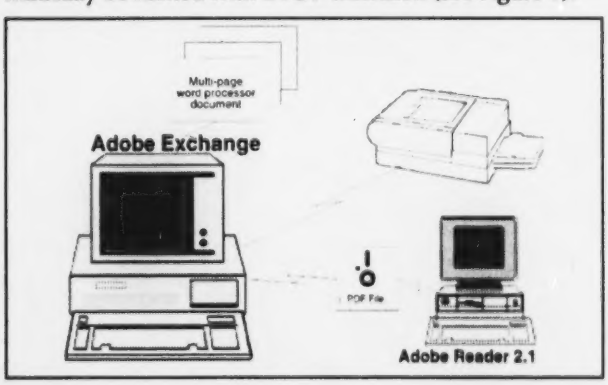

Figure 1.

Hardware Requirements

The Macintosh system requirements specify 2 MB of RAM for the *Acrobat Exchange* and *Reader* programs on Macintosh 68020-68040 systems as the minimum amount needed to run these applications. Power Macintosh systems require 4.5 MB or application RAM to run the *Acrobat Exchange* or *Acrobat Reader*. Apple System Software 7.0 or later is also required (see Figure 2).

PC *Windows* system requires a 386, 486, or Pentium processor running *Windows 3.1*, *Windows '95*, or *Windows NT 3.5* or later. Four megabytes of RAM are needed to run the *Acrobat Exchange* or the *Adobe Reader* applications (see Figure 2).

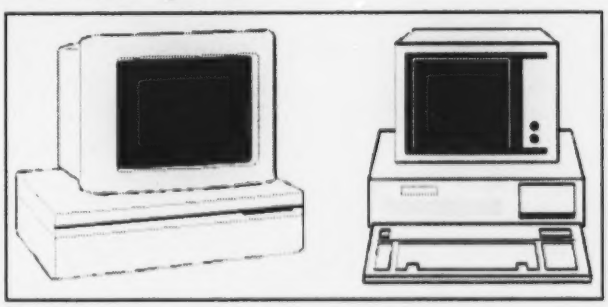

Figure 2.

Free Reader

The *Adobe Reader* is distributed free of charge by Adobe on the World Wide Web. The Adobe WWW address is http://www.adobe.com. With the purchase of the *Adobe Acrobat*, owners receive the license privilege to distribute the *Adobe Reader* to receivers of their PDF published documents. The *Adobe Reader* is the runtime software needed to view PDF documents as if they were printed on paper (see Figure 3).

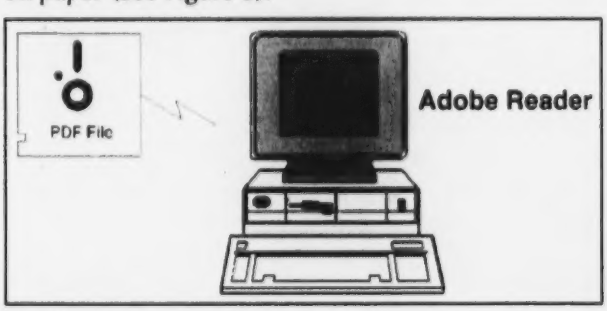

Figure 3.

Using The Adobe Acrobat Exchange

Before the *Adobe Exchange* application can be used to create a PDF file, a word processor or similar application must create the document (see Figure 4). The first step in the process is to open a word processor or other application that has printing capabilities. The application is then used to create a document with the PDFWriter-On-DISK print driver. The PDFWriter is selected as the printer using the Window's print setup dialog window. Conversion of the word processor document takes place and a doc.PDF file is created with a PDF extension appended. Of course, the user may follow these same steps using a spreadsheet, or other application that normally sends output to a printer.

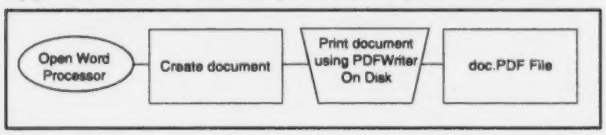

Figure 4.

Next, the *Adobe Exchange* program is started and the *Exchange* program opens the PDF file (see Figure 5). The number of steps required to process the document is similar to the process listed above. The *Adobe Exchange* program opens the PDF file and the user then adds attributes such a bookmark, notes, hypertext links, *QuickTime* Movies, or inserts pages from other PDF documents.

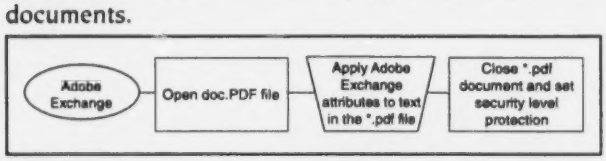
Adobe Exchange
Open doc.PDF file
Apply Adobe Exchange attributes to text in the *.pdf file
Close *.pdf document and set security level protection

Figure 5.

Portable Document Format files may be protected with password security to prevent tampering. Hypertext links may be inserted creating links to location within the current document or to other PDF files. World Wide Web (Internet) URL addresses may also be used as hypertext links.

Graphics inserted into the PDF document will appear within the *Adobe Exchange* processed PDF file when viewed with the *Adobe Reader*. Of particular interest is the ability to insert notes into a PDF. Annotation enables multiple readers to collaborate on both the document form and its content. Collaboration takes place when the reviewer places a note beside text or graphics in the PDF file.

Using The Adobe Acrobat Reader

The *Acrobat Reader* makes possible searches through a PDF document for specific text while viewing the PDF document. Hypertext links maybe accessed when the cursor changes to a pointing finger. An overview area allows the viewer to see thumbnail abstracts of each page. By clicking on a page number or thumbnail view, the user may move to any section in the document. Areas within each page may also be viewed at higher magnification with a magnifying glass tool.

As noted above the *Adobe Exchange* application and the *Adobe Reader* programs make possible publishing and electronic distribution without paper. For people who enjoy the look and feel of printed documents, the *Adobe Reader* can enable the printing of the electronic document being viewed to paper using a printer.

The electronic PDF documents may be distributed online through modem exchanges, through a LAN, or even on a floppy disk. The only requirement is that the user have the *Adobe Acrobat Reader* and a Mac or PC application running the appropriate operating system.

Electronic Tutorials

The tutorial and exercises that accompany the *Adobe Acrobat Exchange* program include sample spreadsheets and word processor documents. The functionality of the *Exchange* program extends to other applications such as flowchart programs and presentation/authoring systems. Presentation applications normally are used to create onscreen slide shows, but even this type of graphic and text display may be printed as a PDF document.

The *Adobe Exchange* program tutorial covers the process that enables an author to insert notes for annotation purposes on PDF files created by system applications (see Figure 6).

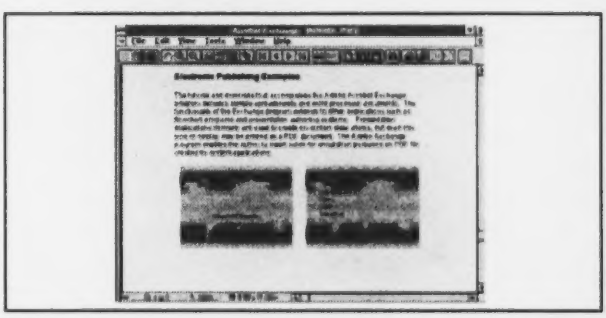

Figure 6.

The *Adobe Exchange* application also enables reviewers to insert their personal notes into a document that is being reviewed without changing the text. These notes promote communication among reviewers and speed the collaborative process in document development. Teacher who are attempting to use collaboration as an instructional tool will find this function valuable for promotion of group work.

Final document versions may also contain notes for review by readers. These appended notes can be used to bring add meaning to text and illustration that may require additional explanatory information. This feature is valuable in a collaborative development and learning environment where many people respond to a draft or a teacher's annotation of a student's papers or notes.

Conclusion

Educational pricing is available from vendors, but shopping for the best price remains an imperative for the budget conscious consumers. Learning to use of this application does not require intellectual mountain-climbing gear. A 30-minute to one-hour session with the tutorials will have most users up and electronically publishing.

Users must keep in mind, however, that copyright issues normally associated with paper-printed documents now become a computer users' responsibility. This includes graphics and text content intellectual property rights issues. Electronic publishing has come to the PC and with it, the obligations that have long been associated with the publishing industry.

George Fornshell may be contacted at Nova Southeastern University, 800/986-2247 Ext. 8945. His electronic mail address is gforn@alpha.acast.nova.edu.

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HyperCard Tutorial: Getting Started

Linda Martyr and Valerie Prigaro

Introduction

HyperCard is a program in which you create cards and link them in a stack (group of cards) to produce an interactive presentation. In this tutorial you will make a stack with information on the solar system. After you have tried each new skill, you may wish to experiment with alternate styles or arrangements.

You will be designing three cards and linking these cards, so that they will appear if you press on "buttons" on the cards.

Getting Started

Turn on the computer. Open *HyperCard*. Home card will appear. Pull down File menu and select New Stack. At prompt, name stack "Solar System." Blank card will appear. You will create a picture of the solar system on this card using the paint tools.

Pull down Tools menu (see Figure 1) and drag it to the upper right corner. These are the tools you will use to create your cards. See page 26 for explanation of the Tools icons.

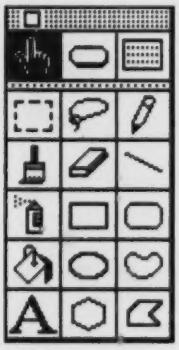


Figure 1.

Click on Oval Drawing tool. Pull down Options menu. Select Draw Centered. Pull down Options menu again and select Draw Multiple.

Before you start to draw on your card, note that you can Undo the previous command by selecting Undo from the Edit menu or by pressing Command-Z.

Place cursor in middle of card. Click and drag to the lower right hand corner. Experiment until you have nine concentric ovals. Use Eraser to erase unwanted lines or add more ovals one at a time by deselecting Draw Multiple from the Options menu.

Click on Patterns menu and drag it to upper left corner. Select solid black pattern from the Patterns menu. Double click on Oval Drawing tool icon to Draw Filled. Place cursor in center of card and draw solid circle for the Sun. Add other planets according to size, as you wish.

Double click on the Oval Drawing tool icon to deselect Draw Filled and draw rings on Saturn and Neptune.

When you are happy with your picture, press Command-K to keep this card. This will save your card. If you later make changes, but want to revert to the last saved version of the card, select Revert from the Paint menu.

Double click on Text tool icon to see Text dialog box (see Figure 2). Select a font that is available in size 24 point, such as New York. Select Outline style.

Click on lower left corner of card to position cursor and type "Our Solar System."

Now you are ready to create a button to link this card with another. Let's create a button on the Sun that will take the user to an information card.

Button Procedure

Click on Button icon at top of Tools menu.

Pull down Objects menu and select New Button. Size and position button by dragging on the corners. Make sure the button covers the Sun.

Double click on the new button. The button dialog box will appear (se Figure 3). Name this button "Sun." Deselect Show Name. Click on Transparent for the style

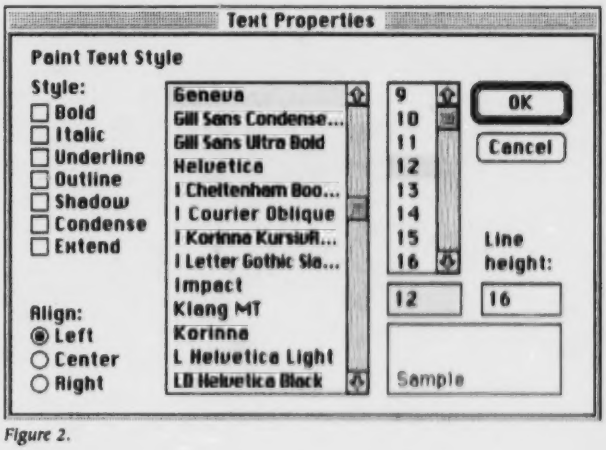


Figure 2.

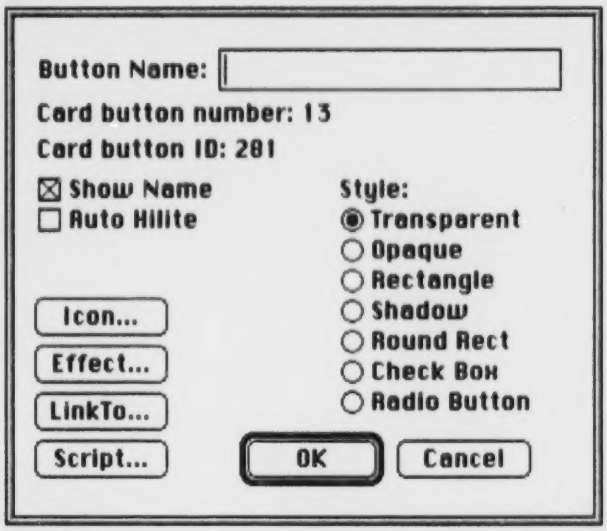


Figure 3.

to make this button invisible. Click on effect and select Iris Open and press OK. Double click on your new button again and, in dialog box, click on LINK TO, make a new card by pressing Command-N (a blank card will appear), and click on This Card. You have now linked the first card with this new card, and it will appear when you click on the Sun. Select the Browse tool and try your new button. Type "Sun" on this new card and type facts about the Sun.

To go back to your first card, select Previous under Go menu or press Command-2 (go to previous card).

Now use the Button Procedure outlined above to create a button on the Earth, sizing and naming it appropriately. Link it to a new card on which you type "Earth" and add facts about the Earth. Draw a large filled circle on this card, as you did with the planets on the solar system page. Draw a smaller filled circle next to the first one and create a button on this small circle named "Moon." This time leave Show Name selected. This will label your button. Link this button to a new card on which you type "Moon" and facts about the Moon.

So far, you have been painting and adding buttons on the card layers only. Now you will create a button to link the solar system card with all others in the stack. In order to link all cards in the stack, the button must in the background layer. Since all of the cards in your stack share the same background, this button will appear on all cards. You may want to mask it on the "Solar System" card by painting over it with white (selected from the Pattern menu).

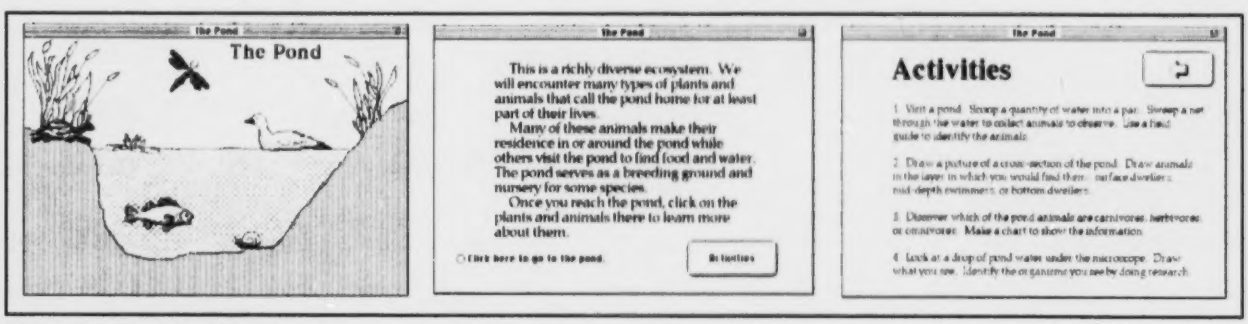
Go to the "Solar System" card by selecting First under the Go menu or pressing Command-1 (go to first card). Press Command-B to go to the background layer. Striping will appear on the menu bar to remind you that you are in the background layer.

Create a button named "Solar System" using the Button Procedure outlined above, except this time click on Icon to select an icon to identify your button. Position this button in the lower right hand corner. Choose an appropriate icon from the Icon menu and double click on your choice. Link it to the "Solar System" card.

Leave background by again pressing Command-B. Select Scroll Right as the Effect. Select Browse tool and test button by clicking on the Earth button, then clicking on the Solar system button. You should return to the first card. Try this from all of your cards.

You now know how to paint on the card layer, create buttons and link cards to one another. Experiment, if you wish create buttons for the other planets.

***Linda Martyr** and **Valerie Prigaro** are classroom teachers in Northern New Jersey. This work was produced when they were graduate teacher education students at William Paterson College of New Jersey.*


The Pond
The Pond
This is a richly diverse ecosystem. We will encounter many types of plants and animals that call the pond home for at least part of their lives.
Many of these animals make their residence in or around the pond while others visit the pond to find food and water. The pond serves as a breeding ground and nursery for some species.
Once you reach the pond, click on the plants and animals there to learn more about them.
Click here to go to the pond.
Activities

Sample cards from the "Ponds" stack

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Tools	Click on tool	Double-click on tool	Drag with tool
Browse tool (turns into I-beam over unlocked fields)	Selects Browse tool; used to click buttons, edit field text		Selects field text
Button tool	Selects Button tool; used to create, modify buttons		From middle moves button; from corner resizes button
Field tool	Selects Field tool; used to create, modify fields		From middle moves field; from corner resizes field
Selection tool (marquee)	Reveals paint menus	Selects entire graphics layer	Selects rectangular picture; moves selection
Lasso	Reveals paint menus	Selects all images in graphics layer	Selects irregularly sized picture (shrink to fit); moves selection
Pencil	Reveals paint menus	Toggles FatBits on/off	Draws fine line
Paintbrush	Reveals paint menus	Displays Brush Shapes dialog box	Draws with selected pattern and brush shape
Eraser	Reveals paint menus	Erases entire graphic layer	Erases graphics
Straight Line	Reveals paint menus	Displays Line Size dialog box	Draws straight line
Spray Can	Reveals paint menus		Paints spray with selected pattern
Rectangle	Reveals paint menus	Toggles Draw Filled on/off	Draws rectangle with selected line width
Rounded Rectangle	Reveals paint menus	Toggles Draw Filled on/off	Draws rounded rectangle with selected line width
Oval	Reveals paint menus	Toggles Draw Filled on/off	Draws oval with selected line width
Curve	Reveals paint menus	Toggles Draw Filled on/off	Draws irregular curved shapes with selected line width
Regular Polygon	Reveals paint menus	Displays Polygon Sides dialog box	Draws regular polygon with selected line width
Polygon	Reveals paint menus	Toggles Draw Filled on/off	Draws irregular polygon with selected line width
Paint Bucket	Reveals paint menus	Toggles the display of the Patterns palette on/off	Click to fill surrounded graphic area with pattern
Paint Text	Reveals paint menus	Reveals Paint Text Style dialog box	Click to position pointer for typing paint text

Letters

HyperNexus is the HyperSIG journal, the forum established for SIG interaction. The three letters that appear below are published with permission from the authors. Please include a statement of permission to publish in part or entirety with all surface mail or e-mail letters.

To the Editor:

Welcome to the editor's position of *HyperNexus*. Your first issue provided interesting reading. One thing I think the magazine needs in order to increase interest in the SIG involves a broader approach to hypermedia. While I love *HyperCard*, I believe the group needs to embrace *HyperStudio*, *LinkWay*, *Toolbook*, and *Express Author*. I realize you publish only that which you receive. I do hope you can identify [users of a wide range of authoring systems] to help expand coverage in the journal.

Ivan W. Baugh; IvanBaugh@aol.com

Editor's reply: Ivan is right on target. I think the issues are moving in the direction he suggested. Please keep the articles, reports, projects, and pictures coming.

To the Editor:

I received volume 5, numbers 1 and 2 and like it a lot. You have done a good job. I have shared it with students around here (College of Education, University of Texas at Austin).

Min Liu; mliu@mail.utexas.edu

Editor's reply: Min is published in this issue. See her article on the use of videodisc in the early childhood classroom.

To the Editor:

I am Rick Overbaugh, Assistant Professor of Instructional Technology at Old Dominion University in Norfolk, VA. I happened across your article, "Hypermedia-based Teacher Education" and felt like responding. I was struck by the similarity of your class structure and mine. I, also, discourage the continuation of students who are not willing to work. Holding a rigorous class results in low attendance and sometimes low evaluations but my beliefs/values will not allow me to dilute the requirements.

I, too, have developed the instructional design component through readings. This semester, I switched to an instructional design textbook which has generated far more resistance than did the readings—at least among the teachers in the course. Within my classes, there are also industry-based folks and instructional designers from the military who welcome the text with open arms. Have you used instructional design books in the past and decided to settle on readings for a reason?

I wish the class could have three major and equal components: instructional design, learning the software, and readings about research, theory, and application. The [teacher] audience does not appear willing to put forth sufficient effort to master all aspects of hypermedia applications development. Any suggestions?

I am considering changing to *HyperStudio*. Are you aware of any books or teaching materials available that would avoid constructing a course from scratch?

Rick Overbaugh; RCO100F@eagle.cc.odu.edu

Editor's reply: Rick has opened a dialogue appropriate to the SIG. Whether you are a K–12 teacher or a teacher-of-teachers using authoring systems, Rick's letter should make you wish to respond. I have received many questions from readers, colleagues, and doctoral students about HyperStudio textbooks. Here is the information I have gathered.

First, let me explain that HyperStudio is a resource directed at grades 5–12. That is why its books are not available through college textbook publishers or trade book stores. ISTE at 1-800-336-5191 offers Sharp (1994) HyperStudio in One Hour: Second Edition at a member's price of $17.95. Thomson Learning Tools at 1-800-824-5179 has Cochran and Staats (1995) HyperStudio Quick Course at $14.50. At this writing, I have seen neither book.

HyperNexus would like to publish short, positive reviews of textbooks for use at all levels of hypermedia/multimedia learning. A book that you have determined meets a need and your user population reacts accordingly, is precisely one we want to feature. Does anyone have a good, easy-to-use instructional design teacher-education text to recommend to Rick?

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HyperNexus Volume 6 Number 1/2

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HyperNexus: Journal of Hypermedia and Multimedia Studies is the journal for the SIG. Published quarterly, *HyperNexus* brings together new ideas, new ways of thinking, and prominent voices in the area.

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HyperNexus is published quarterly by the International Society for Technology in Education Special Interest Group for Hypermedia and Multimedia. *HyperNexus* seeks articles on K-12 and college instructional applications of hypermedia and multimedia in teacher presentation and student learning. Case study product reviews are welcome.

Two double-spaced hard copies of manuscripts with screen dumps and an ascii file (noting platform and wordprocessor used) should be sent by land mail. Include your name, address, phone, and e-mail address. Receipt of manuscripts will be acknowledged electronically.

Send manuscript package to the editor:
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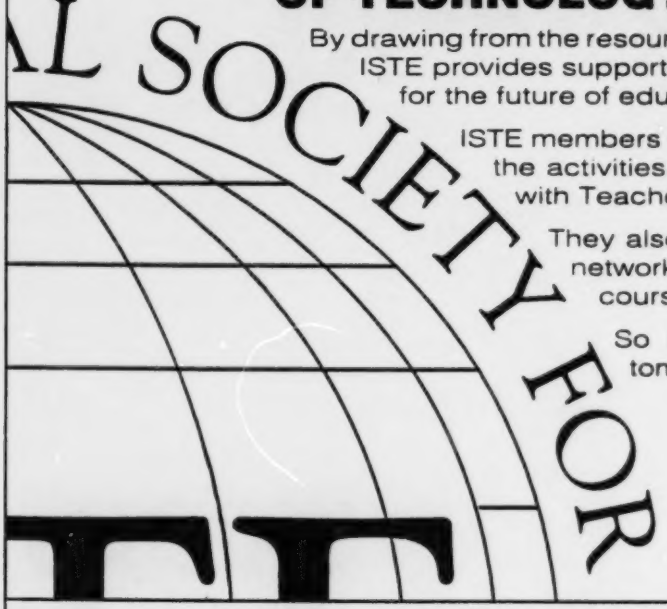

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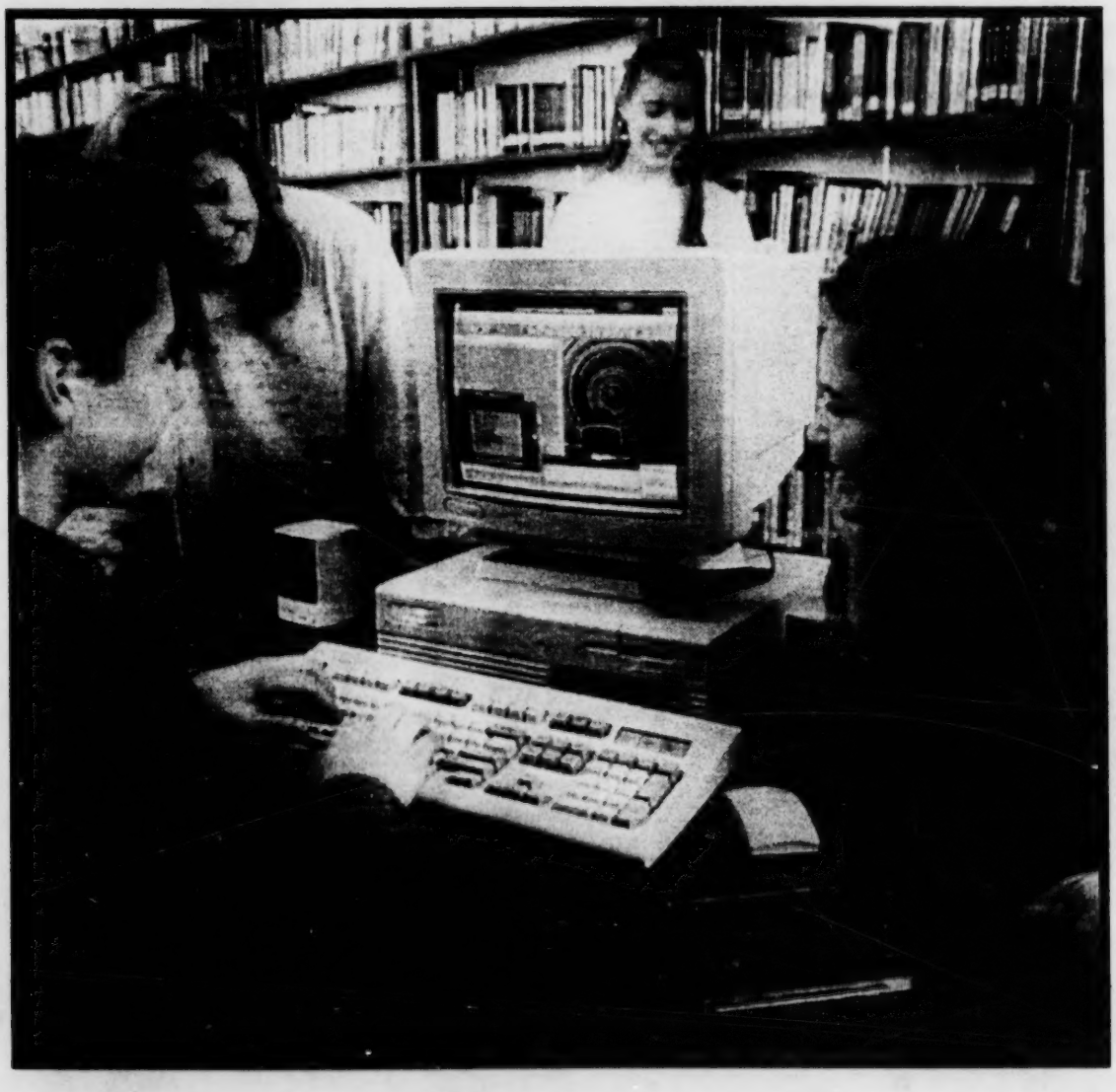

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Learning With Virtual Reality

Teaching With Presentation Managers

HyperNexus Volume 6 Number 3

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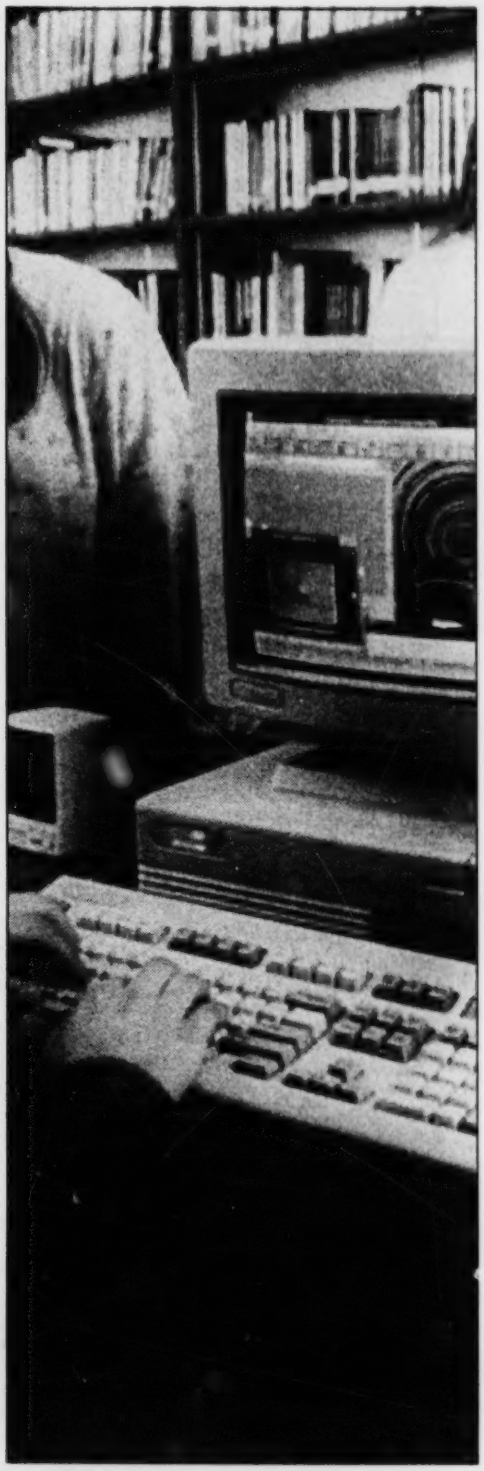

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In This Issue

Trudy Abramson

Just when this issue was about to begin production, volume 6 numbers 1/2 arrived in the mail. Within a week, four readers sent e-mail; ergo, the Letters page is alive and well. With volume 6 number 3, *HyperNexus* is back to separate issues. Number 4 will follow shortly and next year should be totally on track. These pages include hot-off-the-press high technology and tried-and-true low technology. Inside you will find five articles that address a wide range of work using different tools and platforms across the grades, and user-oriented book and software reviews. Descriptions of each article follow. As always, contributions from HyperSIG members are essential if issues are to be forthcoming. Please send us your letters, articles, and multimedia files for dissemination to the SIG. In particular, classroom applications of hypermedia/multimedia are being solicited.

Paola Williams, HyperSIG chair and computer education/social studies teacher, devotes her column to a call for nominations for the HyperSIG Board of Directors. This is your opportunity to become a more active member of the SIG.

Marlyn Kemper Littman, professor of technology and information sciences, is heavily involved in state-of-the-art technology and curriculum development. In her article, she introduces us to real people who are producing real products in virtual reality environments. Her enthusiasm is truly contagious.

Stan Wollock, professor of teacher education, is a real (not virtual) wizard at helping pre- and inservice teachers improve their teaching skills. This article details a successful low-tech support technique for learning to write lesson plans that work well in the classroom.

Shawnya Yamaguchi, developer of interactive multimedia training applications, brings her corporate experience to the high school. She shares with us feedback from high school students as they work through a two-week assignment that combines content learning and technology implementation.

Trudy Abramson, *HyperNexus* editor and professor of computing technologies in education, shifts gears from promoting hypermedia and multimedia as interactive learning technologies to examining the roles these technologies play in the presentation of instruction.

Bruce Mann, assistant professor of educational computing, describes a procedure for adding digitized voice files to hypermedia/multimedia productions. In an almost tutorial fashion, he provides guidance to users of *ToolBook* on the PC and *HyperCard* on the Mac.

Verdell King, high school principal, reviews a book and disk that provides a joyous introduction to online resources for education. Her technology guru is **George Fornshell**, *HyperNexus* contributing editor and associate professor of computing technologies in education, who walked her through the beginning steps of online communication.

Lisa Deziel-Evans, assistant professor of pharmacology, reviews a very elementary mathematics CD for the home. Her six-year-old daughter Fraser, an experienced computer user, assisted in the evaluation process.

Editor's Note: On page 26 in *HyperNexus* volume 6 numbers 1/2, there is a chart designed to help *HyperCard* users with the pull-down tools menu. The chart was designed and developed by George Beekman and was copied from the inside back cover of his book, *HyperCard 2 in a Hurry* (Wadsworth, 1992), a well written and easy-to-follow text. This editor has used the book in a graduate teacher-education course and, based upon student feedback, wholeheartedly recommends it to *HyperCard* novices.

HyperSIG Elections

Paola Williams

Every ISTE special interest group (SIG) has an elected Board of Directors that serves as its governing body. Six positions on the board are available with terms of office of two and three years. Duties of the directors include developing and deciding SIG policies, assisting with the publication of *HyperNexus*, and, when possible, attending the general HyperSIG annual meeting at the National Educational Computing Conference (NECC). HyperSIG elections will be conducted as part of the annual business meeting at NECC '96 in Minneapolis, Minnesota, June 11–13.

Every HyperSIG member in good standing is eligible to stand for one of these positions. You may become a "member in good standing" by subscribing to the SIG as an add-on to ISTE membership for the nominal fee of $20.00, which entitles you to your own copies of this journal. If you are an undergraduate or graduate student, SIG membership is only $12.00. For more information, call ISTE at 800/336-5191.

HyperNexus is our SIG journal, our primary instrument for communicating with members. Therefore, we are using this forum to accept nominations for directors. A slate will be compiled and the material you provide will be made available to members attending the meeting at NECC. Although we would like as wide a representation as possible at NECC, you need not be present to be part of the slate. Votes will be cast for six candidates. The three nominees receiving the greatest number of votes will serve on the Board for three years and the next three will serve for two years.

To nominate yourself, please send the following information:

Name, ISTE membership number
Full address and prefered phone number (home or office)
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A consise paragraph suitable for inclusion on the ballot.

Nominations will be accepted until May 10, 1996. Please take care of this today before it is pushed to the back of your to-do list. I prefer responses to be e-mailed to me at pwilliam@lava.net If you do not have e-mail, please send nominations by snail (surface) mail.

Aloha,
Paola Williams
HyperSIG Chair

Paola D. Williams, *1074 Oilipuu Place, Honolulu, HI 96825; ph. 808/395-4967; e-mail: pwilliam@lava.net.*

Perspectives on Virtual Reality in the Learning Environment

Marlyn Kemper Littman

Introduction

Picture high school seniors in Miami, San Diego, and Chicago learning about early civilizations by exploring virtual reconstructions of ancient settlements in Turkey, Egypt, and the Sudan under the direction of a subject specialist in London. This application, currently under development by the Learning Sites Project, illustrates the potentialof virtual reality (VR) for supporting instructional enrichment. According to project coordinator Donald Sanders (personal communication, November 7, 1995), VR will enable us to experience archaeology, astronomy, history, and the social sciences in ways we have only begun to imagine.

VR can lead to the creation of dynamic educational paradigms in a technology-mediated environment. With VR applications, students can become absorbed by another reality and immersed in the learning activity. However, promises associated with this powerful medium extend far beyond its present capabilities. Few individuals have actually put on VR gear to experience moving about or manipulating objects in a virtual world. The design of VR environments for representing classroom concepts is complex. The advantages and drawbacks of interactive VR experiences are not yet fully understood.

What is Virtual Reality?

Virtual reality (VR) is used to describe such phenomena as telepresence, synthetic environments, and artificial or augmented realities. Generally, VR refers to a computer-generated, immersive, multisensory, interactive experience that provides participants with the illusion of being in a 3-D (three dimensional) or virtual environment (Littman, in press).

A virtual environment incorporates auditory, olfactory, tactile, visual, and somatic sensations; color, texture, lighting, acoustic, and atmospheric cues; animated sequences; virtual objects; and real-time images into a model of reality. VR is an interdisciplinary field based on an amalgam of methods and techniques from engineering, robotics, computer science, computer graphics, learning theory, physics, telecommunications, and the performing arts.

VR Configurations

VR development requires a multimedia computing system with graphics capabilities for generating visual images on a display screen that are consistent with the direction in which the participant is looking in the virtual environment. VR input and output devices, such as instrumented gloves and vests, body suits, head mounted displays (HMDs), 3-D trackers, and 3-D mice that sense and respond to body movements, support an individual's perception of immersion. VR software toolkits from such vendors as Sense8 Corporation (Mill Valley, California), Virtus Corporation (Carey, North Carolina), and Virtual Reality Laboratories, Inc. (San Luis Obispo, California) expedite construction of virtual environments.

Paul Breen, Jr. (personal communication, July 17, 1995), Head of the Human Factors, Displays, and Visualization Department for MITRE Corporation, notes that the price of a VR configuration varies with its complexity. Research-based VR systems generally found in large corporate settings can cost more than a million dollars. Sense8 Corporation and Intergraph Computer Systems (Huntsville, Alabama) have recently developed high-performance, next-generation workstation-level VR systems priced at less than $10,000. Entry-level desktop configurations can be assembled for approximately $2,500. Expenditures for peripheral VR devices must also be taken into account in budgeting for VR use.

VR Applications

A virtual environment can range from a realistic representation of a kitchen, airport, bulldozer, embryo, battlefield, or car accident to the imaginative visualization of cave paintings and folktales. VR technology is employed in simulations for firefighting, entertain-

ment, museum exhibits, manufacturing, military training, urban planning, medical consultations, and surgical instruction. At Georgia Institute of Technology's Graphics Visualization and Usability Center, VR exposure therapy is used for treating such psychological disorders as the fear of heights and the fear of flying (http://www.cc.gatech.edu/gvu/virtual/Phobia/phobia.html/).

Technical advances in computer hardware, software, and communications networks have contributed to the emergence of innovative VR applications in the learning environment. Dean Inman (personal communication, November 13, 1995), Research Scientist and Project Director for Virtual Reality Labs at the Oregon Research Institute, is involved in the development and implementation of four VR training scenarios for teaching physically challenged youngsters mobility skills and cognitive strategies so that they can independently operate motorized wheelchairs in the school and community.

Ted Carpenter-Smith (personal communication, November 15, 1995), Technical Specialist for Andersen Consulting, noted that at his company, VR is a cost-effective solution for teaching the fundamentals of object-oriented technology and design. Carpenter-Smith added that with VR, a knowledge of the English language for business professionals from foreign countries training at the education center in St. Charles, Illinois is no longer a requisite for learning. According to Carpenter-Smith, VR helps learners visualize and understand abstract concepts and information, thus making it a powerful tool for instruction.

Joel Mambretti (personal communication, November 13, 1995) is Director of Academic Computing Services at the University of Chicago. Mambretti said that the University of Chicago is currently using the CAVE automated virtual environment at the University of Illinois at Chicago for evaluating such VR applications as medical imaging, scientific visualization, and biological and chemical molecular modeling in promoting research and curricular development (http://www.ncsa.uiuc.edu/EVL/docs/html/CAVE.html). The CAVE is an immersive, room-sized VR setting that allows multiple users to share a virtual experience. Mambretti related that the University of Chicago is also involved in designing an ATM (asynchronous transfer mode) network to support the implementation of distributed simulations so that individuals in CAVEs at the University of

Applications of Virtual Reality Technology

Caterpillar engineers drive new vehicle designs in a virtual world created using CAD data and *WorldToolKit* software (see Figures 1, 2, and 3).

Figure 1.

Figure 2.

Figure 3.

WorldToolKit is also being used to help keep the National Guard up to date on the expensive technology they repair. Figures 4 and 5 show Guardsmen working with an advanced training system designed by the Research Triangle Institute.

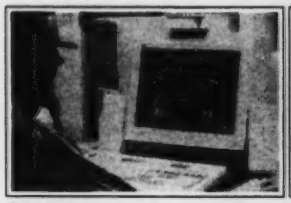

Figure 4.

Figure 5.

VR software can be used to simulate outdoor activities. In the example in Figure 6, hiking "avatars" can watch video clips explaining the surrounding terrain and tour the Ring Mountain Preserve with a geology professor in real time.

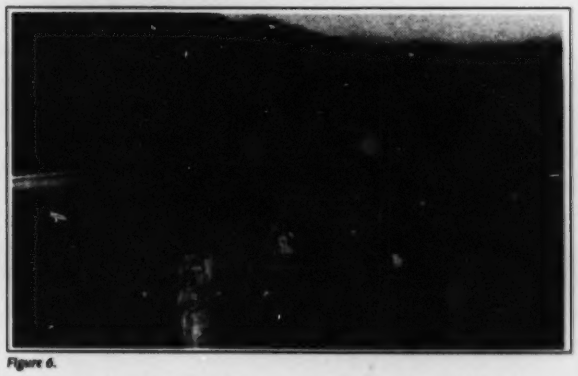

Figure 6.

Figures 1, 2, and 3 courtesy of Caterpillar, Inc., NCSA, and Sense8 Corporation. Figures 4 and 5 courtesy of Research Triangle Institute and Sense8 Corporation. Figure 6 provided by Sense8 Corporation and NTT Human Interface Laboratories.

Illinois at Chicago and Argonne National Laboratory can collaborate in a shared virtual world.

Darren Crane (personal communication, July 15, 1995), Virtual Lab Director at Clemson University, noted that prototypes of VR systems supporting photo-realistic environments for undergraduate instructional use are in development (http://fantasia.eng.clemson.edu/~dcrane). The School of Architecture at Mississippi State University School in association with the U.S. Department of Education has implemented an architectural walkthrough on structural design for undergraduate students (http://www.erc.msstate.edu/thrusts/scivi/vr/index_vcawp.html).

Developed by George Mason University, the University of Houston–Downtown, and the VR Lab at Johnson Space Center, Project ScienceSpace involves an ongoing assessment of VR use for facilitating student understanding of scientific concepts associated with such subjects as physics and earth sciences (http://www.jsc.nasa.gov/cssb/vr/ScienceSpace/ScienceSpace.html). The Human Interface Technology Lab at the University of Washington has instituted the US West Virtual Reality Roving Vehicle (VRRV) Program. VRRV is designed to introduce students and their teachers to virtual world building activities dealing with curricular units that include chemistry and wetlands ecology (http://www.hitl.washington.edu/projects/education/vrrv/). In constructing virtual worlds, students determine how objects are selected and depicted. Direct participation in creating immersive environments promotes learning even among those students with disabilities who have difficulty working with text-based material.

ExploreNet is a project created by the Computer Science Department and Institute for Simulation and Training at the University of Central Florida in Orlando for bringing youngsters together in networked virtual communities (http://longwood.cs.ucf.edu:80/ExploreNet/). ExploreNet applications feature role-playing games, collaborative problem solving, and multi-age mentoring.

These examples demonstrate that VR implementation can support a wide range of instructional methods and pedagogical models for curricular delivery. With VR, course content for achieving learning goals can be adapted to individual competencies and temperaments. Students can move forward into new material based on their preferences and abilities. In addition to supporting consistent quality classroom programming, VR applications can facilitate teacher training, help at-risk students improve their academic performance, and extend educational experiences beyond the confines of the classroom.

Challenges

A fully immersive VR application is designed to make participants feel as if they exist totally in a virtual world apart from their physical reality (Littman, 1996). That immediacy generates debate on strategies for presenting VR applications in the classroom (Littman, in press). We are concerned that violence in two dimensions, for example in movies and video games, can trigger destructive behavior. What happens if violence is internalized in VR war simulations that are virtually indistinguishable from reality? Will these experiences desensitize students to the value of human life and the disturbing consequences of actual shotgun blasts and gang murders? What is the emotional impact of experiencing a virtual plane crash, virtual hurricane, virtual shark attack, or virtual substance abuse? If there is concern with what happens to the psyches of students by observing real traumas, how do we protect them from the effects of virtually experiencing traumas?

Outcomes associated with VR implementation in the school setting are unpredictable. What are the advantages and limitations of VR instruction in comparison with traditional classroom instruction? What kinds of reinforcement will students need for effectively understanding a virtual application? What forms of preparation will aid educators in optimizing virtual experiences for their students? How will students determine if the VR simulation is balanced and accurately portrayed? Consider the consequences if a course on the Holocaust is created with a VR demonstration in which the student becomes Hitler or a victim of a gas chamber. VR presents an unexplored universe. Additional research is needed to understand the ways in which students interact with VR environments, the impact of these environments on their behavior, and types of problems that could occur from extensive VR use (Littman, in press).

VR Assessment

Design decisions for VR application development include a determination of the available budget, learning objectives that will be supported, and hardware and

software requirements (Littman, in press). VR applications can be evaluated in terms of interface design, system performance, interactivity, and the fidelity with which the actual situation is replicated in the virtual environment. VR deployment can be hampered by technical limitations. Poor synchronization between user movement and system response time can spoil the feeling of immersion. VR participants can suffer from disorientation, nausea, chronic fatigue, and simulator sickness. Questions like the following can assist in VR application assessment.

- Are the contents of the application objectively and clearly presented?
- Can the user interface accommodate learner needs and requirements?
- Can the application reach multiple senses, support different learning styles, and expand the range of student experiences, thereby enabling the acquisition of general and specific academic competencies?
- Is the application consistent with school guidelines?
- What are the total costs involved? Is VR implementation financially feasible?

VR and the Internet

The Internet is a rich source of information for monitoring VR advancements (Littman, in press). A popular VR newsgroup is sci.virtual-worlds. Developments in VRML (Virtual Reality Modeling Language), a standard for including 3-D information on the Web, are noted at such sites as http://rosebud.sdsc.edu/vrml/ and http//www.oki.com/vrml/VRML_FAQ.html.

The Internet also enables user involvement in simulated activities. The Mercury Project developed by the University of Southern California (USC) fostered a sense of virtual presence on the Web for a community of dispersed users who viewed and excavated artifacts in a sand-filled terrarium by operating a robot arm (http://cwis.usc.edu:80/dept/raiders/). Another USC telerobotics installation on the Web, the Tele-Garden supported collaboration among remote participants who shared in the creation and maintenance of a garden filled with seedlings and living plants (http://www.usc.edu/dept/garden/).

Conclusion

The field of VR is changing rapidly. VR applications can be designed with varied equipment and products. The network infrastructure for supporting distributed VR applications is still evolving. Concern with the performance of VR software and hardware and potential challenges in VR implementation, while important, should not overshadow the significance of VR for facilitating educational activities in the school setting. My research to date indicates VR can transform classroom instruction and research and promote the mastery of academic skills. An understanding of VR capabilities and constraints will enable educators to effectively design and deploy VR applications for curricular enrichment in the learning environment.

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MiniCam, VCR Tape, and a Better Way to Prepare Teachers

Stan Wollock

Introduction

Traditionally, college students studying to become teachers plan and prepare minilessons to present to their peers. The purposes of the assignments are to learn how to prepare lessons in a logical manner and to have an audience on which their presentation skills could be tested. These practices are often followed by the crushing criticism of the professor on planning lessons, and, after presenting lessons to others, bruised student egos despite damage-control methods. It became vividly clear to this author that many students had been nurtured by their parents to believe that whatever they attempt is magically transformed into perfection. The obvious conflicts could only impede the learning process of neophyte teachers.

Problem Statement

This teacher of teachers wrestled with the problem of preparing effective teachers in a positive and productive environment where bruised egos could be avoided. The solution was developed about seven years ago after many failed attempts to find a better way. Numerous experiments were launched in the process and the effort proceeded until the solution was reached. It all seems so easy now, in retrospect.

A minicam, VCR, and monitor were borrowed from the AV office. The first taping was awkward but informative. The presentations were recorded on a single VCR tape and the professor reviewed the tape numerous times and presented the tape in a subsequent class meeting along with suggestions for improved presentations. Ego-bruising was minimized, but not eliminated, and the new method was still cumbersome. In addition, the AV office had only two minicams that had to be reserved weeks in advance, and were often unavailable because of routine maintenance or repair work. The idea was a good one but not easily workable and often unreliable. How to improve the system, the learning opportunity, and the reliability factor were unresolved questions.

Numerous requests to obtain equipment specifically for this project fell on unresponsive ears. Freely given admonitions included such statements as, "We never needed these gadgets before," and "Why don't you do it like it's always been done?" Yes, significantly more time and effort could have been invested in convincing, writing, justifying, and pleading but it was time to retreat to the origins of the problem.

Had the need for technology been overstated? Was the problem real? Could a solution be achieved through technology and a revision of a time-honored practice? Or was the plan inappropriate and the problem inflated? These questions developed anguish because it was perceived that a solution to the problem was indeed at hand and that there really was a better way to proceed. The "anguished" determined to forge ahead without administrative support.

One thousand dollars of personal funds were expended as an investment in this project. A minicam was purchased and a science education colleague agreed to share a VCR and monitor that he had won with a science facilities grant two years earlier. Another professor donated an outdated but adequate tripod on wheels and an extension cord. The project could proceed.

For the past five years students seeking certification as K–12 subject matter majors have had the opportunity to develop their teaching skills with the method about to be unfolded publicly for the first time. It may not seem revolutionary to some but it has been for the students at this institution. It should be recognized as just a simple step forward in a time when technology abounds but the recognition for its value lags far beyond.

The students represent about eleven different majors and most aspire to teach in the secondary schools. They meet together as one class once a week for one semester prior to a one-semester internship (formerly known as student teaching).

The course, identified as CISE 410: Secondary Education II, Management and Application (3 credits), accommodates about twenty-five students. Each student receives an extensive student syllabus at the beginning session along with appropriate explanation and time for questions and answers. Of the sixteen two-hour-and-

forty-min sessions, ten are directly or indirectly related to the development of platform teaching skills. Those sessions are listed in the following section as they appear in the student syllabus.

Solution

1. ***Course Introduction:*** distribution and review of student syllabi; introduction to the notion of lesson plan and student guide sheet construction.
2. ***Preparation Session:*** organizing for peer teaching presentations; reviewing lesson plan and student guide sheet construction; understanding a timed format for presentations and preparing for the camera. For next session: read and comprehend the entire syllabus and develop a calendar of commitments for the entire semester.
3. ***Workshop and Peer Instruction Standards:*** visual aids and instructional puppetry (review puppetry student guide sheet); BRING: scissors, paper, ruler, eraser, pencil, markers (WATER BASE ONLY), stapler and staples, yarn and fabric scraps, a clean old sock, sewing needle and thread, assorted buttons, and two small lunch bags, etc.; quality standards for peer instructional presentations. DUE: one page, typed, single-spaced, with precisely 25 words to each paragraph, with one paragraph per topic, entitled: "Philosophy of Education." Using the library, develop the following topics: [1] The purpose of the high school in the education of the child, [2] The contribution that (my subject area) can make in the development of the student; and [3] The purpose of the high school teacher in the development of the child. Be certain to indicate sources after each paragraph. Sources should be timely; refer to periodical literature no older than 1992.
4. ***Curriculum Materials Orientation:*** (note meeting place, and plan to arrive promptly); accessing syllabi and examples in specific subject areas, presented by a Curriculum Materials Room Librarian; outline for course of study and quality standards for the syllabus development assignment; begin subject matter syllabus search.
5. ***Sample Peer Presentations:*** (note location); sample lesson presentations on VCR tapes from varying subject fields will be reviewed in preparation for your presentations in the following weeks; timing, quality, and preparation will be discussed. DUE: single-spaced, single typed page: "Giving birth to puppets, a personal experience."
6. ***Peer Lesson Number One:*** presented and taped; follow instructional format regarding preparation, presentation, time utilization, dissemination of print materials; TOPIC: general survey or introductory lesson; BRING VCR TAPE, TYPED LESSON PLAN AND STUDENT GUIDE SHEET COPIES FOR EACH PERSON IN THE CLASS and a prefabricated VISUAL AID to back up the lesson (see Lesson Presentation Standards). DRESS FOR PRESENTATION.
7. ***Peer Lesson Number Two:*** reread previous peer lesson for directions; TOPIC: teaching about safety (in your subject field) to junior high school students, using at least two puppets. DRESS FOR PRESENTATION; BRING VCR TAPE, LESSON PLANS AND STUDENT GUIDE SHEETS FOR EVERYONE PRESENT.
8. ***Peer Lesson Number Three:*** reread directions; TOPIC: depict a notable personality (luminary) in your subject area and characterize him/her to the audience through your presentation in costume; BRING VCR TAPE, COSTUME, LESSON PLANS AND STUDENT GUIDE SHEETS FOR EVERYONE. DUE: Single-spaced, single typed page, "Developing an effective lesson; a personal view."
9. ***Peer Presentation Number Four:*** reread directions; TOPIC: a concluding lesson from a series of five lessons in your subject field in what was covered in the sessions and "pull it all together" (and in this session you will circulate through the audience); DRESS FOR PRESENTATION, BRING VCR TAPE, LESSON PLANS AND STUDENT GUIDE SHEETS FOR EVERYONE.
10. ***Peer Presentation Number Four:*** reread directions; TOPIC: optional (but in your subject field); this is to be your best (and fantastic) lesson; DRESS FOR PRESENTATION, BRING VCR TAPE, LESSON PLANS AND STUDENT GUIDE SHEETS FOR EVERYONE.
11. ***Applied Management Techniques:*** planning and organizing the teaching effort; "what if..." questions and answers; self evaluation, ALL PAPERS DUE. DUE: Single spaced, single typed page, "An efficient and effective method for creating lesson plans and presentations."
12. ***Make-Up Peer Presentation:*** limit of ONE may be made-up or redone; appropriate materials must be prepared and distributed, as with previous presentations. Reviewing the gain; remembering the past; preparing for the future. DUE: Single-spaced, single typed page, "Professional obligations of a teacher of

(your subject field)." SUBMIT: properly identified VCR tape and be certain it is wound to the beginning of peer presentation number one.

Conclusion

The result of this effort rests in the development of teaching skills among the students, as evidenced in their own appreciation for their worth as teachers, the observations of the classroom teachers to whom they are assigned in the field, the reaction of the high school students and other student teachers assigned to the same high schools. The other student teachers repeatedly ask questions like the following:

- Where did you learn to teach with such confidence and organization?
- How did you develop a feeling for a logical pattern in the learning sequence?
- Why are the high school students so attentive to your presentation?
- How do you know what to teach?

These questions are generally followed by the clincher: "Will you show me how to develop a lesson plan?"

Of course, nothing should be left undone and the development of the students' teaching required the development of a more extensive lesson plan to better prepare the lesson and to deliver it proficiently. The plan will be left for a future writing, however, as will the outline for the development of a one-year syllabus in the student's specific subject field. As a final touch, it is interesting to note that students are prepared for teaching job interviews and proudly take along the one-year syllabus, a variety of lesson plans, student guide sheets (containing lesson reference material), and the coveted VCR tape to give the interviewer a sample of teaching techniques and proficiencies. Watching this project develop and providing an opportunity for students to increase their skills has indeed been rewarding.

Dr. Stan Wollock is a professor of curriculum and instruction at William Paterson College in Wayne, New Jersey, 07470. He has created an extended education-recreation program for prisoners at a New Jersey State Prison, developed a program to produce teachers for the prison system and instituted a residency plan for student teachers at the prisons. He has taught classes in elementary, junior high, and senior high schools, been a system-wide subject supervisor, directed an adult education school, and administered an experimental learning center.

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As of November 1, 1995, ISTE's Area Code changed from 503 to 541.

"This AND That": Instructional Technology Integration

Shawnya Yamaguchi

Introduction

Until two years ago, I had spent my career designing and developing interactive multimedia training applications for corporations. I believed in the power of teaching with multimedia and wanted to share that knowledge in the field of education, so I began teaching teachers. This story is about one of my students, high school English teacher Dr. Clemi McLaren, and her analytical reading students at the Kamehameha Secondary School in Honolulu, Hawaii. Partnering together, we integrated technology into an existing lesson plan using the "This AND That" instructional technology methodology. [Editor's note: "This" relates to curriculum and "that" to technology-based implementation of the lessons.]

The "This AND That" Assignment

The assignment focused on a conventional reading and writing lesson ("This") with multimedia technology and techniques ("That") threaded throughout the process. The students, juniors and seniors, divided themselves into groups of two, three, or four to complete the tasks. These groups selected topics; read articles on the topics; wrote four summaries/responses to their readings; completed a brainstorming activity; engaged in group and class discussions; researched their topics; developed a storyboard (Figure 1); attended two days of technology training; filled out preproject forms; gathered multimedia materials; completed multimedia essays using the computer, photographs, graphics, music, and narration; wrote progress logs; developed an evaluation rubric (Figure 2); wrote an

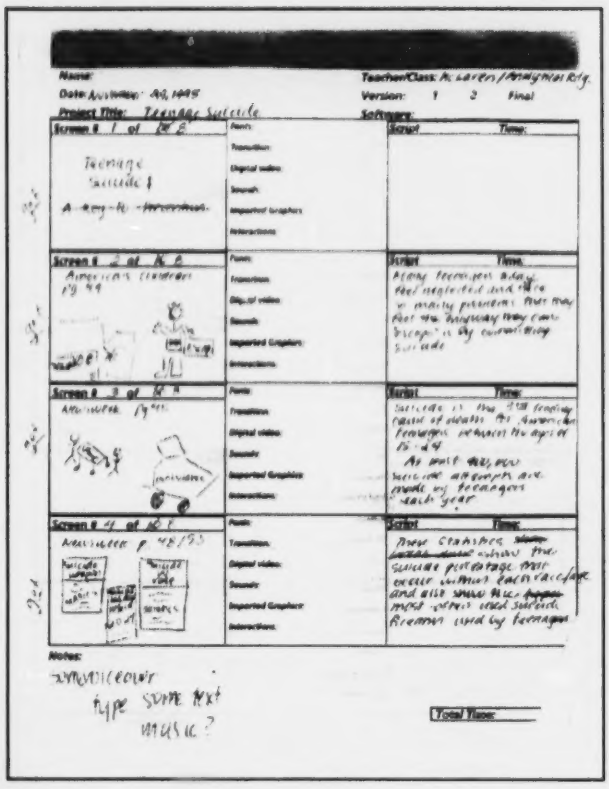

Figure 1.

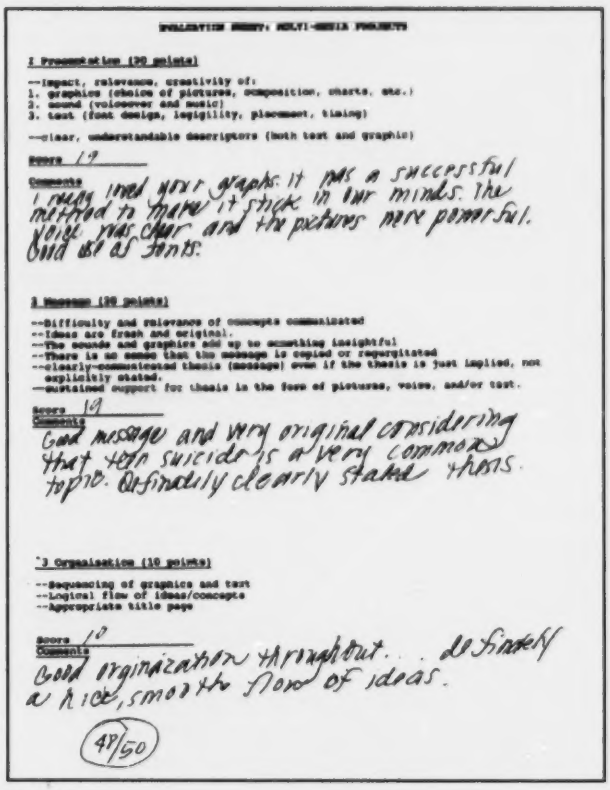
1 Presentation (30 points)
--Impact, relevance, creativity of:
1. graphics (choice of pictures, composition, charts, etc.)
2. sound (voiceover and music)
3. text (font design, legibility, placement, timing)
--clear, understandable descriptors (both text and graphic)
Score 19
Comments
I really liked your graphs. It was a successful method to make it stick in our minds. The voice was clear and the pictures were powerful. Good use of fonts.
2 Message (30 points)
--Difficulty and relevance of concepts communicated
--Ideas are fresh and original.
--The sounds and graphics add up to something insightful
--There is no doubt that the message is copied or regurgitated
--clearly-communicated thesis (message) even if the thesis is just implied, not explicitly stated.
--sustained support for thesis in the form of pictures, voice, and/or text.
Score 19
Comments
Good message and very original considering that teen suicide is a very common topic. Definately clearly stated thesis.
3 Organization (10 points)
--Sequencing of graphics and text
--Logical flow of ideas/concepts
--Appropriate title page
Score 10
Comments
Good organization throughout... definitely a nice, smooth flow of ideas.
(49/50)

Figure 2.

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essay; presented their multimedia essays (Figure 3); compiled bibliographies (Figure 4); completed peer evaluations (Figure 2); filled out final evaluation forms; and identified two to three vocabulary words from their essays and taught them to the class. Student comments will illustrate reaction to the assignment.

The Projects

Our group project will be on teen suicides—why they occur and how to prevent them.

We would like to communicate how explosives information is readily available on the Internet.

Opposing views on abstinence and sex.

Telling a Ka'ao (legend) in Hawaiian.

Insight on gays.

When filling out the preproject forms, students focused on the content instead of the technology when describing their projects. This illustrates the importance of how the assignment is perceived by the students and validates the significance of the "This AND That" methodology.

Student Expectations

I expect to learn how to work on the computers and to gain more knowledge about the frequent bombings at Universities and airports.

Learn communications.

How to work better with computers and how to communicate.

I hope to gain a better understanding about teenage suicide and to learn about the multimedia systems.

Teamwork.

Better understanding of computers and homosexuals.

Better use of multimedia computers and teamwork.

I will learn how to work together and also learn more about these computers.

To familiarize myself more with computers. Learn skills that will benefit me later in college and work.

How to efficiently allocate the multimedia resources.

Student expectations of what they will learn from an assignment almost always mirror the expectations of the instructor. If the teacher's primary focus is on the technology, the students will follow suit. Note the focus for some of these students includes

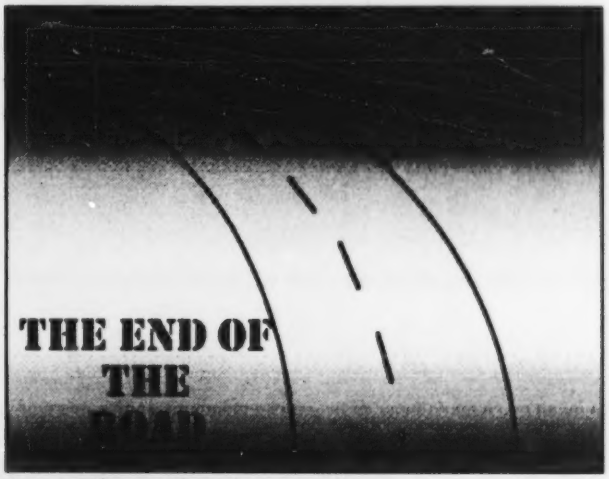

Figure 3. Title screen of project on peer pressure.

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Trager, Oliver. "America's Children: New Generation, New Troubles." New York: Baker and Taylor Books, p. 89, 1991.

Figure 4. Bibliography for project on teen suicide.

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computers, however it is only a part of what they deem valuable.

The Process

Initially, we brainstormed for ideas and subtopics for our multimedia project. Then we found graphics that we felt conveyed our message.

Our group chose a specific topic—teenage suicide. With that in mind, we started our research—reading magazine articles, books, newspapers, and anything else that would give us solid information to inform and hold the interest of our audience.

First, we gathered pictures from magazines and books. Secondly, we began writing out storyline and gathered information and statistics.

On the first day that we went into the [Student Multimedia Room], we recorded all of the things that we had to say for each frame. The day after that, we scanned all that we had to. These two days were kind of easy since we had everything planned as of what to say and what pictures to scan.

Documenting, discriminating between the different forms of communication resources, writing in multiple formats (paper, script, and screen text), and reflecting on reflections heightened the levels of metacognition, problem solving, and critical-thinking skills required to complete the tasks.

Collaboration

Our group really did a good job. We were able to work together to get the job done. Because of this, we were able to complete our goal ahead of time!

My group members and I really got along together and each person contributed. Everything worked well and smoothly and went along great.

Dave didn't fool around that much so we got more done. I enjoyed this project. This is a good project for students to do.

Throughout the past week our group has worked diligently and effectively. We finished our report with no problems. Overall I feel our group worked productively and had a great time composing this computer slide show.

As for time management, we were on the ball. All of our pictures were done at the Student Production Center by the both of us, as we participated equally.

Our group worked well together but, at times, we got grouchy with each other. Overall, our group buckled down when we needed to and even put in time outside of the period to finish our project.

As a group, I felt we worked good together. We were able to get a lot of work done in a little amount of time.

We worked hard and got along well. We were very prepared and had all the materials ready.

Collaborative groupwork for most subjects is difficult to manage and leaves some students out in the cold, either by choice or circumstance. "This AND That" assignments incorporate technology techniques that naturally create an environment where teamwork and individual contributions are necessary to complete the assignment.

How Did They Feel?

I really feel like I accomplished something when we were putting this thing together and I would definitely love to do something else using multimedia.

The project was good, very good.

This project taught me new computer skills that I will need for the college life and outside world.

The hardest part for us was trying to remember exactly what needed to be done to "get this" or "do that" or "change this." I did go in to work on our project many times during my free period and

that's how a lot of rough edges got straightened out. I think overall we did an excellent job in portraying the legend of three menehune.

I thought that is was a worthwhile experience to be in the Student Multimedia Room because of how this world is becoming dependent on computers. It was good that we learned and had a head start with multimedia because I know that we will definitely see this type of work in college.

These responses were written before the students presented their finished projects and received their grades. The assignment was a very positive experience for all those involved, including the teacher and myself.

What Did They Learn?

I learned a lot about suicide while doing this multimedia project. I'm glad that we had the opportunity to do this topic because now I am more aware and have a lot more knowledge to tell when someone is depressed and feels like taking their life.

We used the visual aspect in our project to show how gays are as normal as any other beings on the planet.

I used my time wisely and had a lot of fun.

I found this unit to be especially worthwhile. Instead of doing long compositions, we were able to work in our own groups and develop our writing skills by using computers. I was able to express myself and get my message across in a different manner.

I learned how to use *ClarisWorks* and work efficiently as a group.

How to use alternative resources.

I feel these slide show projects should be continued as a part of your course because it is not only educational but it was really fun. What helped was having to do four summary responses before we went to start our report on the computer.

I really enjoyed this project. It was a lot easier that I thought it was going to be. I think its because we planned our project very carefully.

The goals and objectives of the assignment included student demonstration of time management, planning, content mastery, collaboration, and appropriate allocation of multimedia resources. The process of reading, thinking, writing, and doing provides a practical approach for lifelong learning.

So What?

This assignment was also successful in making the projects seem "real" by allowing the students to think about how the projects could be used beyond their classroom. The peer pressure, gay ridicule, and sex in the nineties groups are planning to give their multimedia presentations to the health and human sexuality teachers to use in their classrooms. The Hawaiian legend team will continue to work on their project to create a formal lesson for the Hawaiian Immersion Elementary Schools throughout the islands.

Hopefully with this project others, such as our peers, can look at this and think before committing suicide or try helping out someone who does.

The Bottom Line

Technology should strengthen and support learning in the classroom, expanding the options for teachers using their existing lesson plans. The benefits of the "This AND That" methodology exceed those of the conventional "This OR That" theory of technology in the classroom. "This AND That" makes educational sense and brings the true power of technology into the classroom, focusing on the process itself, the process of learning.

Wow! What an experience it was to do such high technological construction.

Shawnya Yamaguchi, KidTek, Inc., 2408 Burbank Street, Honolulu, HI 96817; ph. 808/524-6463; Fax: 808/595-0243; e-mail: kidtek@pixi.com.

Fine-Tune Teaching With a Presentation Manager

by Trudy Abramson

Presentation Software

Software grouped as presentation managers, like authoring systems, enable the development of linked files with text, graphics, sound, motion, video, and buttons. Whereas many maintain that the two product-types are interchangeable, the intended outputs make for subtle differences in design and product. Authoring systems are tool sets for creating products that will be used interactively by a school child at a desktop, an executive at a workstation, or a shopper at a kiosk. Presentation managers, on the other hand, are used to create products that will be broadcast to people whose participation is essentially listening, observing the speaker, and taking notes. Interaction in this case usually relates to human interaction with the presenter (lecturer, teacher, or trainer). Presentation managers are today's technology solutions (and replacements) for projected slides, projected transparencies, and lesson outliners. Some of the more familiar commercial products are *Microsoft PowerPoint, Lotus FreeLance Graphics, Harvard Graphics,* and *WordPerfect Presentations*. Jerome and Lee (1995) describe these titles as traditional outlining and charting programs that create slide shows. These three attributes—outlining, charting, and presenting slide shows—are the features that facilitate creating and delivering higher quality lessons and presentations.

Shifting Gears

Sometimes we get so involved in one aspect of educational applications of technology that it blinds us to other good things that are happening. Hypermedia as Pencil, the banner I have carried since my early *LinkWay* days (circa 1989), campaigns for a multimedia computer for every cooperative group of four students and constructivist learning using student-developed hypermedia across the subjects and grades. This focus has precluded my awareness of a parallel potential benefit to be accrued to teaching and learning. That is, the development and delivery of new instruction using one computer and presentation manager tools. Mea culpa.

Moment of Discovery

My primary teaching responsibilities at this time are the presentation and mentoring of partially online courses in authoring systems and courseware design/development. The students are professors and instructors in community colleges and small, four year colleges, district administrators and technology coordinators at the high school and elementary levels, industry trainers, and school-based computer teachers. During the first iteration of a doctoral-level authoring systems course last summer, we addressed three different development environments: presentation managers, authoring systems, and HTML authoring for World Wide Web (online hypermedia broadcasting). Through the excellent work of the students and the plethora of supporting articles in the literature, I developed an appreciation of the value of presentation managers for the creation of superior content lessons, the organization of teaching materials, and, serendipitously, the conversion of computer-phobics to computer-enthusiasts.

A Planning and Presentation Tool

If I were teaching a preservice or inservice course for teachers in lesson development or a generic course in methods of teaching, I would use a presentation manager as an essential tool in the lesson development process. There are so many issues that relate both to preparing an effective electronic presentation and building a good, effective lesson that the course's learning objectives would not require modification when the technology use is superimposed on the traditional syllabus.

Prerequisites for student participation are booting up a computer, minimal keyboarding, and word processing, skills that should be required of every college freshman today. One three-hour session and a good book, like Johnson (1995), will get teachers up and running with the software. Although I have chosen to work in *PowerPoint*, any of the packages noted above may be used with equal ease and confidence. My choice was based on *PowerPoint*'s availability on computers at conference sites, our site license at NSU, the overwhelming use of *PowerPoint* by my students in the fulfillment of the assignment on both Mac and PC platforms, and the availability of support materials in the local bookstore.

Gagne's Events of Instruction

At Orlando Multimedia '96, Barbara Clinton of Georgia College and I conducted a workshop on the use of

presentation managers to improve delivery of teaching and training. The goal of the workshop was to examine and experiment with a wide range of features and formats that add to or detract from a computer-supported presentation. We used the technology to teach the technology. Presentation managers let you develop your slides on either a frame-by frame basis or in a linear fashion using a supplied outline format. Reproduced in the sidebars on pages 16 and 17 are the outline and slide presentation from one of the participatory lessons, based upon Gagne's (1992) events of instruction.

The software templates guide the outline development process. The user is prompted for titles and bulleted items. The need for precision actually helps frame the lecture. Sometimes a long lecture (or lesson, speech, or paper) will not lend itself to an outline format. It is much better to discover, in advance, that a presentation is disjointed and to fix it up within the privacy of one's study, than it is to make a presentation and confuse an audience. The outline format greatly facilitates the structure of one's words.

The slide presentation is reproduced in black and white, sans the music and the animation. The design template, "tropical"; was selected for the conference, which was held in Florida. The background is painted shades of blue, reminiscent of a clear, tropical night. The palm fronds are green, the moon is orange. Titles are yellow and text below is white. This busy background is suitable only when the content makes images or clip-art superfluous. There are two music clips, one, a "call to battle" and the other, a "call to peace" for use in a discussion of appropriateness. The bird image flies into place with a "whoosh" from the bottom right to illustrate features of the software. The subject did not call for charts.

Other Presentations

Subsequent issues will feature other slide shows. Although the *HyperNexus* inbox contains several excellent presentations, we have room for more and would love to publish yours. The only way we can move from prototype to widespread implementation is for pioneers to share their work. See the inside back cover for the procedure for submissions to *HyperNexus*.

Events of Instruction Outline

1 ❑ Enhancing Delivery With Presentation Managers
- ▲ Trudy Abramson (Nova Southeastern University)
- ▲ Barbara Clinton (Georgia College)

2 ❑ The Events of Instruction
- ▲ Gain attention
- ▲ State objective
- ▲ Stimulate recall of prior learning
- ▲ Present "distinctive" stimuli
- ▲ Guide learning
- ▲ Elicit performance

3 ❑ The Events of Instruction (2)
- ▲ Provide feedback
- ▲ Assess performance
- ▲ Enhance retention and transfer

4 ❑ Gain Attention of Audience
- ▲ Appropriate background design
- ▲ Colors that "fit" time, light, and place
- ▲ Music that "fits" time and place
- ▲ Move focus to you—away from screen

5 ❑ State Lesson Objective
- ▲ Tutees will explore alternatives in slide show creation
- ▲ Tutees will distinguish between factors that ADD to lesson impact and factors that DETRACT from lesson
- ▲ Tutees will build and analyze shows

6 ❑ Stimulate Recall
- ▲ Who are your learners?
- ▲ How do you deliver instruction?
- ▲ How do you maintain interest level?
- ▲ What needs improvement?

7 ❑ Present the Stimulus
- ▲ Use slide show features to clarify your message

8 ❑ Guide Learning
- ▲ Project key words
- ▲ Project relevant images
- ▲ Change screens as needed
- ▲ Keep screens self-contained
- ▲ Give examples
- ▲ Model desired behaviors

9 ❑ Elicit Performance
- ▲ Construct a model slide show using outline provided by tutee
- ▲ Build two different shows—three slides each

10 ❑ Provide Group Feedback
- ▲ Project each show twice
- ▲ Talk about colors, number of words on screen, background design, fonts/size, and general impact

11 ❑ Assess Performance
- ▲ Construct a new show using the "test" outline
- ▲ Does it meet the "events of instruction" guidelines
- ▲ If yes, mastery is achieved
- ▲ If no, what needs improvement?

12 ❑ Enhance Retention and Transfer
- ▲ Retention means "Has the tutee really mastered the competencies presented?"
- ▲ Transfer means "Can the tutee apply what has been learned to new situations?"

13 ❑ Reference
- ▲ Gagne, R.M., Briggs, L.J., & Wager, W.W. (1992). Principles of instructional design (4th ed.). Orlando, FL: Harcourt, Brace, Jovanovich

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Gagne, R.M., Briggs, L.J., & Wager, W.W. (1992). *Principles of instructional design* (4th ed.). Orlando FL: Harcourt, Brace, Jovanovich.

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Events of Instruction Slides

Enhancing Delivery With Presentation Managers

Trudy Abramson
(Nova Southeastern Univ.)
and
Barbara Clinton
(Georgia College)

The Events of Instruction

- ▲ Gain attention
- ▲ State objective
- ▲ Stimulate recall of prior learning
- ▲ Present "distinctive" stimuli
- ▲ Guide learning
- ▲ Elicit performance

The Events of Instruction (2)

- ▲ Provide feedback
- ▲ Assess performance
- ▲ Enhance retention and transfer

Gain Attention of Audience

- ▲ Appropriate background design
- ▲ Colors that "fit" time, light, and place
- ▲ Music that "fits" time and place
- ▲ Move focus to you—away from screen

State Lesson Objective

- ▲ Tutees will explore alternatives in slide show creation
- ▲ Tutees will distinguish between factors that ADD to lesson impact and factors that DETRACT from lesson
- ▲ Tutees will build and analyze shows

Stimulate Recall

- ▲ Who are your learners?
- ▲ How do you deliver instruction?
- ▲ How do you maintain interest level?
- ▲ What needs improvement?

Present the Stimulus

Use slide show features to clarify your message

Image

Color
arial 44 orange

Size
arial 88

Font
Impact 88

Call to war

Call to peace

Guide Learning

- ▲ Project key words
- ▲ Project relevant images
- ▲ Change screens as needed
- ▲ Keep screens self-contained
- ▲ Give examples
- ▲ Model desired behaviors

Elicit Performance

- ▲ Construct a model slide show using outline provided by tutee
- ▲ Build two different shows—three slides each

Provide Group Feedback

- ▲ Project each show twice
- ▲ Talk about
  - background design
  - colors
  - number of words on screen
  - fonts/size
  - general impact

Assess Performance

- ▲ Construct a new show using the "test" outline
- ▲ Does it meet the "events of instruction" guidelines
- ▲ If yes, mastery is achieved
- ▲ If no, what needs improvement?

Enhance Retention and Transfer

- ▲ Retention means "Has the tutee really mastered the competencies presented?"
- ▲ Transfer means "Can the tutee apply what has been learned to new situations?"

Reference

Gagne, R.M., Briggs, L.J., & Wager, W.W. (1992). Principles of instructional design (4th ed.). Orlando, FL: Harcourt, Brace, Jovanovich

Catching the .WAV: Adding Sound to Hypermedia Learning Environments

Bruce L. Mann

Introduction

This paper describes a procedure for adding sound prompts to hypermedia learning environments created in PC- and Macintosh-based authoring software. On the PC platform, *WaveStudio* has been chosen as the sound production software and *ToolBook* the authoring software. On the Macintosh platform, *HyperSound* has been chosen as the sound production software and *HyperCard* the authoring software. The rapid prototyping capability of these authoring packages qualifies them as an appropriate developmental tools for structuring sound prompts into hypermedia learning environments.

Adding Sound

There is a generic procedure for adding digitized speech to programs created with PC- or Mac-based authoring software. The first part of the process of adding digitized speech to programs created with PC- or Mac-based authoring software involves using authoring software to prepare a document to receive a sound prompt. The second part of the process is concerned with digitizing the sound with the sound production software. The third part of the process involves linking the sound to the program.

Basic Steps

1. Launch the authoring program.
2. Save the new document created by the authoring program as "Flow."
3. Create two screens in your document.
4. Place a button on the first screen in your document.
5. Launch the sound production software.
6. Record your voice.
7. Edit the recorded speech.
8. Save the file in a sound directory/folder as "Future."
9. Close your sound file.
10. Access the button's script area in Flow.
11. In the button's script area, type-in the commands to play Future.
12. Add a "go to next screen" command in the script area.
13. Close and resave the button's script.

This generic procedure can now be applied to the particular platform. Software authoring is relatively easy to learn, produces aesthetically pleasing screen and sound designs, and permits fast prototyping of new design ideas because its links are not "hardwired." On the PC platform, *WaveStudio* by Creative Labs (1994) was chosen as the sound production software and *ToolBook* as the authoring software. On the Macintosh platform, *HyperSound* by Farallon (1991) was chosen as the sound production software and *HyperCard* as the authoring software.

Digitizing Sound on a PC

The first part of the process for adding digitized speech to programs created with PC authoring software involves using *ToolBook* to prepare a document to receive a sound prompt. Launch *ToolBook* and design two pages: a source screen and a target screen. Save the new document in our own directory, such as "c:\bmann\flow.tbk." Next, create a text field on the source screen (page 1) and type "Flowcharting" into it. Then, place a text field on the target screen (page 2) and type "physical vs instructional" and "linear vs branching" into it. You have now finished the first of three parts in the process of adding sound to documents created with *ToolBook*.

The second part of the process is concerned with digitizing the sound with the sound production software. *WaveStudio* (Creative Labs, 1994) on the PC platform makes it possible for learners with a PC and a sound card to record, play, and edit their own wave forms. Wave forms are graphic representations of recorded sound. The *shape* of a wave form tells us something about its tonal qualities, such as its sweetness or harshness. There are three types of wave form shapes: a sine wave, a square wave, and a complex wave. A sine wave is sweet, a square wave is harsh, and a complex wave is rich and full. In general, the

smoother the wave form looks, the cleaner, clearer, and sweeter it sounds. The more corners it has, the harsher it sounds. The more complex the wave form looks, the richer and more natural it sounds. Most sounds have complex wave shapes. Wave forms also indicate the *frequency* and *amplitude* of a sound. Amplitude, represented by the height of a wave form determines the volume or loudness of a sound; the greater the height of the wave form, the louder the sound. The distance between two successive peaks in a wave form is called a *period*. A typical sound wave has a period of .001 seconds or one millisecond. A section of a wave form that is one period long is called one *cycle* of a wave. The *phase* of a wave form indicates where a wave starts. We interpret phase information as the direction from which a sound is coming. The number of peaks in one second is called the *frequency*. A typical sound has a frequency of 1,000 peaks per second, though this is more commonly referred to as either 1,000 cycles, 1000 Hertz (Hz) or 1 kilohertz (KHz) per second. So frequency is the number of vibration cycles per second and determines the *pitch* and *timbre* of a sound; the higher the number of cycles, the higher the pitch. The frequency measures the pitch of a sound; the higher the frequency, the higher the pitch. Figure 1 shows a screen from the *WaveStudio* sound digitizing program for displaying wave forms.

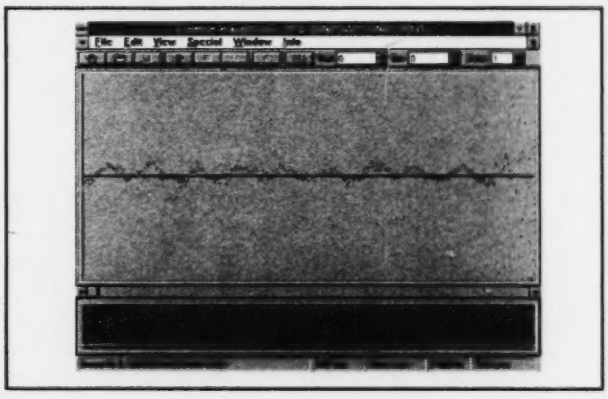

Figure 1.

Launch *WaveStudio* and open a new document under File or click on the appropriate button-bar icon. You must decide what speech to add to the source screen (page 1) of *ToolBook*. It is important to ensure that the meaning contained in the sound prompt is related to but not redundant with the meaning presented in the text and graphics on the target screen; this gives the sound a function in the program. There are several possible functions for sound in a computer program (Mann, 1995a; 1992). You will develop a temporal sound prompt (Mann, 1995b). A temporal sound prompt is a spoken instruction or direction about something appearing on a target screen.

You can now record the prompt by clicking on the red dot on the Button Bar to record. A pop-up dialog box will appear containing the start/stop digitize button. Set the fidelity to Mono and the recording quality to 11kHz. Hold the microphone about six inches from you and speak with a low expressive if you're male or a high expressive female voice if you're female and say, "Distinguish between the following program attributes. Write your answers in the appropriate place in your Workbook." Click the button to stop the process. Next, trim both ends of the waveform by blocking-out both ends of the wave form shown in the edit window and choose the scissors icon. Save the .wav file "c:\bmann\future.wav" in the same directory as the new book file "c:\bmann\flow.tbk." Close the saved .wav file (it won't play otherwise). You have now finished the second of three parts in the process of adding sound to documents created with *ToolBook*.

The third part of the process for adding digitized speech to programs created with authoring software involves linking the sound to the program. Toggle (Alt-Tab) back to the *ToolBook* document "c:\bmann\flow.tbk" and access the button script area in the document. In the button script area, type in the commands to access the "c:\bmann\future.wav" sound file. Add a "go next page" command in the script area:

```
To HANDLE ButtonClick
-(Play a Wavefile)
   get playSound ("c:\bmann\future.wav")
   go next page
END
```

Notice that in this instance the entire path for the sound file ("c:\bmann\future.wav") is specified and is placed in the same directory as the new document ("c:\bmann\flow.tbk") created with *ToolBook*. Also the sound file must be closed and should appear in the same directory as the *ToolBook* file or it will not play. The result is that when the button is clicked the user is sent to the target screen as the future event temporal sound prompt you recorded earlier is played.

You can also add a past event sound prompt (feedback), such as "Write down in what way this is different from the previous example." A past event sound prompt relays spoken feedback about a past event that creates a sense of complementarity with the text and graphics on the target screen. Simply type the critical text or paste a graphic for learners to view as they listen to a previous instruction or direction. This completes the entire process of adding sound to documents created with *ToolBook*.

Digitizing Sound on a Mac

On the Macintosh platform, *HyperSound* (Farallon, 1991) is a *HyperCard* stack that permits the developer to record and play mono and stereo sound, copy sound from *HyperSound* to the SoundEdit mixer, or copy it to other *HyperCard* stacks. *HyperSound* also permits the creation of a Home button in a *HyperCard* Home card. *HyperSound* requires *HyperCard* and the RAM cache set to zero. Figure 2 shows a screen from the *HyperSound* sound digitizing program.

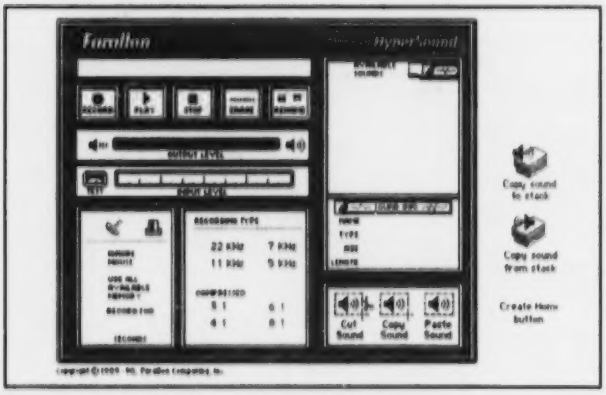

Figure 2.

The procedure for adding digitized speech to stacks created with *HyperCard* is similar to the procedures used for *ToolBook*. The first part of the process for adding digitized speech to programs on the Macintosh platform involves using Mac-based authoring software such as *HyperCard* to prepare a document to receive a sound prompt. First, launch *HyperCard* and ensure that Level 5 (scripting) is enabled in the Home card. Open a new file and save the file as "Flowcharting." Place a new button on the first card. Add a new card and create a field with the field tool. Type in the field on the source screen (page 1) and type "Flowcharting" into it. Then, place a text field on the target screen (page 2) and type "physical vs instructional" and "linear vs branching" into it. Close the *HyperCard* file. You have now finished the first of three parts in the process of adding sound to documents created with *HyperCard*.

The second part in this process involves digitizing the sound with *HyperSound* sound production software. *HyperSound* makes it possible for learners to record, play, and edit their own wave forms. Wave forms, as described earlier, are graphic representations of recorded sound. First, launch *HyperSound*. Now you must decide, as you did with the PC counterpart, what speech to add to the source screen (page 1) of the new program. Again, it is important to ensure that the meaning contained in the sound prompt is related to but not redundant with the meaning presented in the text and graphics on the target screen; this gives the sound a function in the program. Develop a temporal sound prompt (Mann, 1995b) as you did on the PC platform. You'll recall that a temporal sound prompt is a spoken instruction or direction about something appearing on a target screen. Once you know what to say about something appearing on a target screen, you can record the prompt by clicking on the appropriate recording icon (i.e., the printer symbol if the MacRecorder is connected to the printer port, the phone symbol if it's in the modem port). Choose 11kHz for creating sound prompts and click the Record button. A pop-up box appears. Click record in that box. Hold the MacRecorder about six inches from you and to speak with a low expressive if you're male or a high expressive female voice if you're female and say, "Distinguish between the following program attributes. Write your answers in the appropriate place in your Workbook." Click stop when you've finished the prompt. A number assigned to this recorded sound will appear in the Available Sounds window. Click the Rename button to access the pop-up box that prompts the developer to rename the sound. Type in the name change "Future Prompt." The new name now replaces the number in the Available Sounds window. Next, the developer should copy the sound prompt to the clipboard. Click on Copy Sound from the bottom right-hand side of the *HyperSound* card. Now, click the button Copy Sound to Stack on the right-hand side of the *HyperSound* card. You have now finished the second of three parts in the process of

adding sound to documents created in *HyperCard*.

The third part of the process of adding sound to documents created in *HyperCard* involves linking the sound to the program. Open the Macintosh folders and files. Select the filename Future Prompt from the list to reopen that file. When the file is open, a message will appear on the screen, "Select destination card, then paste." Use the left arrow to return to the target card and type Command-V to paste a button containing the sound script on the card. Choose the Selector tool from the Toolbox and click on the button. It will play the temporal sound prompt you recorded earlier. When the sound prompt script is added to a page-turning button script on card id 1, the sound is played as card id 2 is shown. The button script should read simply,

```
On mouseUp
   Play "Future Prompt"
   Go next card
End mouseUp
```

Notice that only the filename is specified in *HyperCard*. Also the *HyperSound* file Future Prompt must be closed and should appear in the same directory as the *HyperCard* file Flowcharting or the button click will not access the sound prompt. The correct result is that when the button is clicked, the user is sent to the target screen as the temporal sound prompt is played.

A past event sound prompt (feedback) can also be added, such as "Write down in what way this is different from the previous example." Again, a past event sound prompt relays spoken feedback about a past event that creates a sense of complementarity with the text and graphics on the target screen. Simply type the critical text or paste a graphic for learners to view as they listen to a previous instruction or direction. This completes the entire process of adding sound to documents created using *HyperCard*.

Conclusion

This article described a procedure for adding sound prompts to documents created with *ToolBook* and *HyperCard* authoring software to focus learners' attention on critical information on the computer screen. Research (Mann, 1992, 1995a, 1995b, in press) has shown that adding sound in this way can successfully orient learners about future events and provide feedback about past events within and between nodes of a hypermedia learning environment.

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A Pragmatic Review of Educator's World Wide Web Tourguide

Verdell King

Introduction

As principal of a 1,700-student middle school in a large metropolitan school district, I am aware of the priority of maintaining high levels of student performance. Recently, my school received a technology grant that will make possible the acquisition of computer hardware and online services and fund teacher training. In preparation for the implementation of this project, we reviewed ways to train the staff effectively and ensure appropriate use and integration of instructional technology. Successful implementation of the teacher training component of the grant will be a key factor in improving education and producing a competent and technologically literate student body for the 21st century in my school.

The Internet and the World Wide Web

Internet technology will provide new ways to access online sources of information and facilitate the transfer of knowledge. It will also require teacher training. With the infusion of the technology grant, some teachers will be engulfed and overwhelmed while others will be propelled by easy access to the World Wide Web. The grant resources will enable the school to provide students with opportunities to become more active learners, researching, analyzing, and evaluating online information. Through Internet and World Wide Web access, teachers and students will experience interactive learning activities directly related to the school's curricular areas. The Web will also introduce students to information otherwise unavailable, thereby making their learning experiences more authentic and meaningful. It is considered essential that teachers become knowledgeable users of Web educational technology. Teachers must concurrently develop instructional technology skills and competencies in order to enable students to become global learners in a rapidly changing world.

Our teachers are aware that large amounts of relevant and current information is no longer isolated in textbooks but is readily accessible through the Internet. Information available on the Internet is often more up to date, pertinent, and accurate than information published in static textbooks, encyclopedias, and other reference sources.

Training Aid

Technology is more likely to have a qualitative impact on education when it is deeply rooted in the processes and learning activities found in the classroom. When students can control their own learning, they are more likely to retain the information they have acquired. According to the school's technology specialist, the *Educator's World Wide Web Tourguide* from the staff of Classroom Connect is a timely and useful resource for teachers and administrators who are beginning to explore the Internet. This single reference combines Internet descriptions and addresses of useful Web sites with tips and ideas on how to use Web sites. The *Tourguide* steers teachers along the Web part of the Information Superhighway and provides teachers and administrators new to the Internet and Web with a road map to useful and appropriate educational sites.

While the technology grant moneys discussed earlier will provide for consultants and teacher training, we found the *Educator's World Wide Web Tourguide* to be an excellent text-based reference suitable for independent use by teachers and administrators. This book is valuable for classroom teachers, library media specialists, and administrators who need to come up to speed quickly on the Internet and the Web.

Like many computer-related texts today, this title has an accompanying CD-ROM that contains a Web browser, a computer program, and sample Web pages. These sample Web pages are also described within the *Tourguide* text. The *Educator's World Wide Web Tourguide* contains definitions of Web terminology in easy-to-understand, nontechnical language.

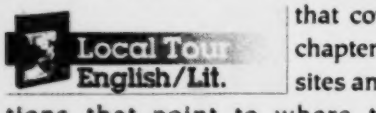
The Web browsers found on the CD-ROM may also be used to access Web pages online or offline. Teachers who already have an Internet access route with a

PPP (Point to Point Protocol) or SLIP (Serial Line Internet Protocol) account may use their own Web browsers and computers to connect to the Internet using a modem and a telephone line. The CD-ROM browser may also be used without an Internet Service Provider account. The browser enables teachers to see what the Web looks like by using their Mac or PC systems to view sample Web pages from the CD-ROM. The browser works offline and displays sample Web pages from the CD-ROM.

A Web browser is an application that interprets HTML (hypertext markup language) files. HTML is used to create Web pages. The Web pages found in the book are also viewable using the browsers and the CD-ROM disk.

Tutorial

The heart of the *Educator's World Wide Web Tourguide* tutorial is found in the eleven subject-area chapters that cover Web sites. Each chapter contains lists of Web sites and additional suggestions that point to where teachers can find supplemental instructional materials.



The *Educator's World Wide Web Tourguide* also describes Web page implementation in the classroom. Subject areas include: art, business, English/literature, foreign languages, geography, health/physical educ- ation, history, mathematics, science, social studies, and vocational education. By surfing the Web with the browser, teachers and students navigate Web pages and menus that lead to documents, files, and other online resources. Teachers and students can download, print, and share the subject-area information they find to enhance their learning process.

Each subject-area chapter covered in the *Educator's World Wide Web Tourguide* contains an adequate sample of instructional Web pages illustrated in black and white. A representative set of full-color Web pages also appears in the center section of the text. Individual Web pages presented in the tutorial also contain a Web address. A brief description accompanies each sample Web page in the tutorial and explains what to expect at each site, such as special features and related points of interest on the Web. Web site content integration ideas are suggested and cover instructional activities for teachers and students.

Here are the addresses for some favorite Web sites and page references for the *Educator's World Wide Web Tourguide*:

- Art—http://Web.leonardo.net/ (See page 11).
- Language—http://Web.willamette.edu/~tjones/Spanish/Spanish-main.html (See page 57).
- Vocational Education—http://Web.petersons.com/ (See page 155).

Appendices

In addition to tutorial content and professional development material for teachers, the *Tourguide* appendices cover a wide range of questions and answers about the Web. These appendices provide teachers and administrators with an excellent description of the online environment.

- What is the World Wide Web?
- How does the World Wide Web work?
- What is hypertext and why is it important to the Web?
- The Web and the Internet—aren't they the same thing?
- How are schools using the Web?
- Where did the Web come from?
- How can I get the Web?

Other Internet tools and terms are explained in the appendices such as http, FTP, and gopher. Online services, rates, and contact information is also found in the appendix section. In addition, a section on how to find and contract with an Internet service provider is reviewed. Free software sources useful for Web access and directions on how to find educational Web sites is covered. Teachers with a desire to have their own Web page will find help on designing and establishing a Web pages at several Web addresses listed in this section.

Conclusion

The *Tourguide* offers an abundance of materials to help teachers educate their students and bring them into the Information Age. In addition, this reference enables

teachers to develop their professional skills. Staff development takes on new meaning through the use of Internet resources. The *Educator's World Wide Web Tourguide* enables teachers to develop and expand school curriculum programs using Internet technology. The glossary of Internet terms found in this reference provides readers with a basic vocabulary. The definitions are explained in clear, nontechnical language. Each subject-area chapter is summarized with a clear, concise description for each Web page presented. This reference book is a "must have" for schools planning to use the Web. It is an essential Internet reference for classroom teachers, administrators, technology specialists, and media center (library) specialists who are struggling to keep up with technology. The easy-to-read text and sample CD-ROM combine to make it an outstanding tool for learning about the Internet.

I have ordered several copies of the book for my teachers and library. I have also recommended the Educator's *World Wide Web Tourguide* and the CD-ROM to my administrative colleagues within the school district. Those teachers in my school who have used the *Educator's World Wide Web Tourguide* have been delighted with the tutorial format for accessing the Web.

Reference

Giagnocavo, G., McLain, T., Distefano, V., Noon, C., & Mauskapf, E. (1995). *Educator's World Wide Web tourguide: A graphical tour of over 200 educational treasures on the World Wide Web.* Lancaster PA: Wentworth World Wide Media; ph. 800/638-1639; WWW: http: //Web.wentworth.com.

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Case Study Review of *Math Workshop!*

by Linda Deziel-Evans

Math Workshop!
Publisher: Brøderbund Software, Inc., 500 Redwood Boulevard, Novato, CA 94948-6121; ph. 800/474-8840
Subject: Mathematics
Age: 6–12 years
Cost: $39.95
System Requirements:
PC—IBM, Tandy, or 100% compatible, 33 MHz 386DX or faster, 4 MB RAM with 2.5 MB free, Hard disk with 950 KB free space, Windows 3.1, MS/PC DOS 5.0 or higher, SuperVGA (640x480, 256 colors), MPC-compliant CD-ROM drive, MPC-compliant sound device, Mouse
MAC—System 7.0.1 or higher, 4 MB RAM with 2.5 MB free, Hard disk with 220 KB free space, Color or gray-scale monitor, 8-bit video support, 256 color or shades of gray, CD-ROM drive, Sound Manager 3.0, 80 KB hard disk space
Reviewers: Lisa Deziel-Evans, assistant professor, Nova Southeastern University, School of Pharmacology, 1750 NE 167 Street, North Miami Beach, FL 33162-3017, e-mail evansl@scis.nova.edu, and **Fraser Evans**, age 6 ½.

Brøderbund's *Math Workshop!* is a delightful program that provides a series of instructional games and drills on CD-ROM to help children learn and develop important math skills, including problem solving, computation, fractions, pattern recognition, estimation, spatial thinking, and logical reasoning. *Math Workshop!* takes place in an odd-looking home that is set up as a workshop full of activities (Figure 1). An intuitive interface, an upbeat soundtrack, and rich colors seem to immerse the user in the actions and encourage children to jump right in.

Brief Description

Children enter the program through a door into an animated, fun-looking control room (Figure 2) where, upon signing in, they have access to all seven of the available areas by just clicking on a picture. The primary area, Bowling for Numbers (Figure 3), is a drill-and-practice section that provides equations to be solved. Children (or parents) can increase and decrease the time limit and the difficulty level of the questions and choose addition, subtraction, multiplication, division, equivalency, or estimation. One hundred questions at each level must be answered correctly in order to be promoted to the next rank and to get a certificate. This encourages children to keep working on the more difficult questions. The Hidden Picture Puzzle, Puzzle Patterns, and Super Stickler sections help children develop geometry and spatial sense and problem-solving skills through the use of puzzles. The Rhythm Shop uses music to help children explore and understand fractions and problem solving. Rhythm beats are built by using fractional pieces. When the fractions are placed in the correct order, Alegbird does an entertaining dance to the rhythm! In Rockets, based on the strategy game Nim, children compete against Poly or a friend. This game develops problem-solving skills, logical reasoning, and whole-number computation. Children have control over several features, including who goes first, how many rockets to use, how many rockets can be launched at each turn, and whether the person who launches the last rocket wins or loses. Pattern Windows is a game that allows children to paint patterns on a skylight for the purpose of developing pattern-recognition skills, geometry skills, and spatial sense. Several fun buttons are included, like the Yuck! (Undo) and Kaleidoscope buttons. Patterns can be printed and up to thirty different patterns can be saved in each child's art gallery.

Figure 1.

Figure 2.

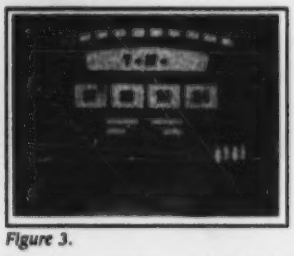

Figure 3.

While many of the drills and games provided in *Math Workshop!* can be duplicated without the computer, the computer allows the games to be completed in a much shorter time period without dealing with the messy parts, like puzzle pieces or flashcards. Feedback to the child is also much more motivating than can be found

without electronic learning. For example, in Bowling for Numbers, each time the user gives ten right answers, Gus the Gorilla appears with a bowling antic. Children can easily print certificates noting their levels of achievement. In the puzzle sections, when the picture is completed, an animated sequence that delights younger users is played. Throughout Math Work*shop!* there is a great deal of verbal feedback such as "Great Job" and "Awesome!" that could not be achieved in a pre-electronic learning mode without a parent or teacher working directly with the child.

While the interface is quite intuitive, children need to be familiar with numbers and with the use of the mouse in order to use the program. Knowledge of simple math operations is needed for Bowling for Numbers. The program is recommended for children ages six through twelve, although younger children will enjoy many aspects of Math Work*shop!* The program is designed to allow a high degree of interaction between the child and the computer. If the child does not interact, the activities do not proceed on their own. Observing my six-year-old child on the program for the past year and a half, I have found that she loves the puzzle sections and continues to laugh at the animations. She finds the drills in Bowling for Numbers somewhat long. Younger children may find that solving one hundred equations before being able to move to a new level is tedious, in spite of the intermittent feedback that occurs. Brøderbund would do well to consider providing more frequent feedback in the lower levels for younger players.

Documentation

The documentation provided is complete and helpful. While most of the interface is intuitive, help is always accessible. Online help is provided by clicking on Poly Gonzales, a happy, easy-going girl, who is always close by with a helpful hint and a pleasant voice. The User's Guide gives detailed descriptions of each activity, pictures of the icons, installation procedures, and troubleshooting hints. An on-screen Parent's Video Guide (*QuickTime* movie) is provided. It describes new teaching methods in primary-level math education, educational strategies of Math Workshop!, and meaningful ways to get more involved in your child's math education. In the Activities and Resources section of the program, parents can print available resources and instructions for math-oriented games and activities.

Computer Management

The computer tracks the progress of up to forty players. Progress is followed through the levels in Bowling for Numbers and allows students to stop in the middle of a level and restart at the same place. Statistics are kept separately for addition, subtraction, multiplication, division, fraction equivalency, and estimation. A beautifully designed screen keeps track of the children's progress, showing them ribbons for each level completed. Certificates can be easily printed from this screen.

An interesting aspect of this program is that it allows the child (or parent) to choose the level of difficulty for each activity. While this is usually not recommended, I observed that my test subject desired to proceed through the levels in order in Bowling for Numbers so that she could obtain new certificates and control over the level of difficulty with the puzzle games was appreciated. Parents also have easy access to several features in the program, including audio, mouse, roster control, and bowling timer control.

Instructional Characteristics

Brøderbund's *Math Workshop!* is a beautifully designed piece of software that is appealing and instructionally appropriate for its targeted audience of children ages 6–10. It provides an intuitive interface that is easy for children to use and includes an upbeat, fun soundtrack. The program uses entertainment to enhance motivation and learning. Math Workshop! is a nonlinear program in which children may choose to work with any activity at any time. Several choices are available within each of the different activities, preventing boredom and providing some student control. The only downside to this is that children may avoid areas in which they are weak and concentrate on areas that are easier for them. Because this tool is primarily designed for home use, parents should work with their children to encourage use of all activities.

Value

Math Workshop! is an exemplary program in both artistic and educational aspects. Its educational value is tremendous and it is well worth the price. It is reassuring that my child continues to play with the program a year and a half after it was purchased. I would recommend *Math Workshop!* to any parent looking to strengthen their child's math skills.

Letters

To the Editor:
Congratulations on an outstanding *HyperNexus* edition. I was beginning to wonder if the journal was worth my investment. This issue proved that I needed to continue with my subscription. Very practical articles!

Bonnie S. Mohnsen; bmohnse@cello.gina.calstate.edu

Editor's reply: Bonnie, sometimes I wonder why I invest so much effort in this project. Letters like yours tell me it is all worthwhile.

Hello, Trudy,
I am a reader of *HyperNexus* and a teacher trainer as well. As a computer consultant for a large school board, I do a great deal of inservicing and help schools with planning for technology. One of my continuing needs is for references to good research that establishes value in using technology—keyboarding, student multimedia production, and so on. Are there any Internet listings or summaries of research? If you know of anything that might be of help to me, I would very much appreciate the information. Thanks in advance.

Thalia Hartson; Thalia_Hartson@epsb.edmonton.ab.ca

Editor's reply: It is significant that so many of us in different places are working on the same or similar wave lengths. The World Wide Web is featured prominently in the next issue. Until that time, you might look for the book that Verdell King reviews in this issue. It provides many addresses worth investigating. Here are some Web sites that might also prove fruitful:

http://www.yahoo.com/Education.tree.html
http://altavista.digital.com
http://www.asu.edu/aff/aera/home.html
http://www.sendit.nodak.edu.k2/

To the Editor:
While reading the latest issue of *HyperNexus*, I noticed an advertisement for a new book, *Kindling the Fire: Integrating HyperCard into the Curriculum*. I plan to order a copy since I use *HyperCard* extensively in my undergraduate and graduate computers in education classes. I also enjoyed the article by Linda Martyr and Valerie Prigaro on "HyperCard Tutorial: Getting Started." Reading your journal is very enjoyable and all I can say is "Keep up the good work.

Ron Pauline; pauline@golden.gannon.edu

Editor's reply: Thank you, Ron, for letting us know the journal works for you. HyperNexus *is the journal of the SIG and it is the contributions of the readers that make it what it is.*

Dear Trudy,
What a great surprise to see your name as the new editor-in-chief of *HyperNexus*. I was in your classes at William Paterson College and learned so much with your help. I am Director of the Teacher Education Computer Lab at St. Elizabeth College of New Jersey and teach graduate courses as well.

This semester I am teaching Issues and Use of Interactive Technologies. Topics include presentation software (*PowerPoint*), hypermedia (*HyperStudio*), telecommunications (AOL and the Internet), distance educations options, interactive and educational TV, and interactive videodisc. The major focus is *PowerPoint*, Scholastic Network (the subset of AOL), and interactive videodisc for hands-on work. The other topics are covered in readings, discussions, and library research. I would be very happy to have input regarding distance education as an educational alternative to the classroom. Actually, I would be glad to have input for any of these areas. I work very hard all the time.

Doris Ehrlich; ehrlich@liza.st-elizabeth.edu

Editor's reply: Doris is one of the outstanding educators I have had the privilege of working with during my professorships. Although so many of us are doing comparable work, we are spread over wide geographic areas and many of us run "one-person shops." In the last issue, Rick Overbaugh extended an invitation for a discussion of instructional design courses. Now, Doris Ehrlich has opened the forum for a discussion of distance education. Readers, let us know what you are doing in these areas.

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Two double-spaced hard copies of manuscripts with screen dumps and an ascii file (noting platform and wordprocessor used) should be sent by land mail. Include your name, address, phone, and e-mail address. Receipt of manuscripts will be acknowledged electronically.

Send manuscript package to the editor:
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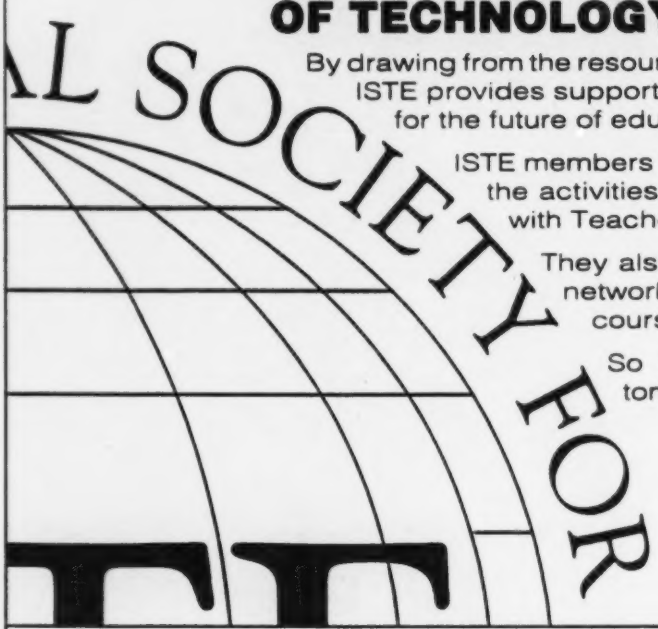

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The World Wide Web—Hypermedia and Multimedia Online

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The Editor's Pulpit

Trudy Abramson

Accommodating Change

As this issue moves from the desktop into production, we are exhilarated. With the ongoing support and encouragement of SCIS Dean Edward Lieblein, ISTE Publications Coordinator Jennifer Roland, and all the contributors to this volume, the marathon has been completed. This issue should reach you in August of 1996; Volume 7 is in the works with four exciting issues planned. Beginning with this volume, an index will be included at the end of each volume. We urge widespread participation from our readers. We need to hear from teachers whose classes are filled with first-generation computer-using children who type before they print with pencils, whose mouse skills and icon recognition are truly amazing to adult observers. To meet the needs of today's children, major curriculum revisions are indicated. Teachers, tell us what you do, show us what the children are developing. Discuss new curricula, new assessment methods, administrative and school board support, availability of resources, impact on testing, student productions, and so on.

As an indication of how today's children are spending their time, Nielsen Media Research found that in 33% of the households surveyed, the child had used a computer "some" or "a lot" of the previous day (Fabrikant, 1996). This research was conducted by advertisers who need to know how and where to direct their advertising. This research is valuable to us as educators who must make learning evolve with changes in society.

An international student competition called "Odyssey of the Mind" is based upon the vision that the future belongs to those who learn creative problem-solving skills as children. The key is "divergent thinking," the ability to take mental risks and explore multiple solutions. Because no one knows what problems today's second graders will face as adults, schools must encourage creativity through diverse thinking and foster the discipline needed to pursue solutions. Important components of these competitions are risk taking, style, discipline, team work, and little or no adult intervention (Schwartz, 1995). Articles that report on divergent thinking projects would be very well received by our readers.

World Wide Web

The explosively popular World Wide Web is an online environment that features the very tools of our trade—hypermedia and multimedia (H&M). We SIG members should be patting ourselves on our backs because we have long recognized that words, images, and links are the keys that revolutionize communication. We are proponents of the use of technology as tools and products for improving the quality, intensity, and interest level of learning. We are educators with a special interest in H&M, educators who are always searching for new and better ways to teach and learn.

For decades, academics have used the Internet for professional networking, collaborative working, and asynchronous conversion. Suddenly, with the advent of HTML, H&M online, the Internet has become a household word. Now, through telecommunications, everything that can be translated to words, pictures, and links can be mounted on the Web. There is no special fee for publishing on the Web. Publication on the Web requires access to a Web server, a powerful computer that will hold the content and provide access to many users in relatively the same time. With some exceptions, there are no user fees for browsing or searching the Web. To locate and read information from the Web, a tool called a browser, such as *Netscape Navigator*, which can be downloaded without charge, is needed. Just as prospective authors begin by studying a great deal of literature, prospective Web authors should begin by doing a great deal of browsing.

As educators, we must heed the warning signs that accompany this explosion in availability of information. We know that information does not equal learning. As a learning resource, information is raw material that must be molded, nurtured, and guided before value may be ascribed. Due (1996) observes that students in the year 2000 will be exposed to more information in that year than their parents were in a lifetime. The meaning or value of that observation depends upon the ways learning is restructured to accommodate the information explosion.

H&M Tools and Products

Our tools fall under three broad classifications: presen-

tation managers, which add H&M to the lecture process; authoring systems, which are used to create content-rich courseware; and HyperText Markup Language (HTML), used to put information on the World Wide Web (WWW or the Web). Our products cover reference materials, such as encyclopedias and atlases; simulations as diverse as shopping, flying a plane, and dissecting a pig; drill and practice in mathematics and language arts; tutorials for every subject, academic and vocational; and, of course, educational games. Our journal seeks to report on the full range of tools and products.

Within These Pages

Paola Williams, SIGHyper Chair, uses her message column to invite all readers to journey onto the Web. She acknowledges that access is not universal at this point but urges everyone to persevere.

Ever the teacher-educator, **Trudy Abramson** addresses the needs of readers new to online communications with a gentle, comprehensive introduction to using the Web.

Featured is another of **Paola Williams'** popular Web Wanderings columns. Paola is a highly experienced user of online resources, a teacher whose pragmatic recommendations are implementable in a variety of school settings. If you try one of her suggestions, let *HyperNexus* know about it.

Following their well-received workshops on designing WWW documents, **Elizabeth Boling** and **Sonny Kirkland** created a guide for Web site developers. There is so much excellent content in this work that it is presented in two issues. Even our readers who are about to take their first baby-steps onto the Web with this issue, will be ready to attempt development in the fall when the second half of this article is published.

To continue the work on presentation managers, **Beverly Simon** contributes a valuable article for H&M developers in which she recommends an optimal hardware and software workstation configuration. Read the article twice, once without the slide show and once with it. Presentation managers truly provide us with easy-to-prepare, easy-to-deliver lesson enhancement.

Ronald Pauline writes a *HyperCard* tutorial for creating a teacher tool, an individualized testing program. This article provides detailed instructions for using the scripting features of *HyperCard*.

Thomas A. Drazdowski earns an A for responding to a request made by Rick Overbaugh in an earlier issue. For our Mac users, Tom reviews *HyperStudio 3.0 in One Hour*.

Sharron Redden shares a graphically enhanced case study review of *Thinkin' Things*. Sharron's work as a technology expert across the grades and ages enables her to see a product from the vantage of children, parents, and teachers.

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Message From the Chair

Paola Williams

As the school year draws to a close and we look toward the summer months to rejuvenate and revitalize, it might be a good time to look back and reflect on the explosion taking place in many sectors of our society. This explosion can be seen advertised on local television channels, in newspapers, and in business journals. We have come to know this phenomenon as the Internet, but more specifically "the Web."

For many citizens, this remains a foreign and alien term. Educators have become aware of its presence as another possible cure for what ails the America's schools. Certainly watching our President and Vice President pull fiber-optic cable in California during March's Net Day '96 and their subsequent "Web surfing" to the White House home page, made us all aware that if we were not yet familiar with "the Web," we'd better find out fast what it was all about!

Caution is not my intent, but I chuckle at the thought that having another tool, even a high-powered one, is really useless to those of us in classrooms that lack desks, teaching materials, and access to telephone lines.

In a recent posting on a high-profile Web page, viewers were informed that although 99% of American public schools have computers and 93% of students use them, these numbers are misleading. Many of these computers are old, not networkable, and are unable to use current versions of Web browsers (i.e. *Netscape 2.0*). Resources close to the statistics tell us that most computers in schools are falling far short of the goal of providing students with what they need in today's world.

As you browse through this issue of *HyperNexus*, you will notice that we have emphasized this very resource. I suggest that your reflecting begin by asking yourself what would be the perfect classroom environment in which to carry out a project using the Internet and the World Wide Web. Describe the perfect project in which you and your students might become involved; then list the barriers to implementing such a project.

As you learn to navigate through the vast resources available to you and your students, question the content, the purpose, and what you and your students will know and be able to do once you have climbed aboard the information highway. Especially, where is it that you want to go?

Good luck with your journey!

aloha
Paola Williams
SIGHyper Chair

All Aboard the Net ... Via the Web

Trudy Abramson

The *World Wide Web* (WWW), hypermedia and multimedia *online*, is everywhere. Nevertheless, there are still many people with expertise in stand-alone computer applications who have yet to answer the sirens' calls. The objective of this article is to demystify the ubiquitous Web technology so that every reader can eagerly climb aboard and obtain the full benefits of the explosion of online hypermedia/multimedia information. What follows is a gentle introduction to accessing the *Internet* with a *Web browser*. All terms that are explained in the glossary sidebar are italicized the first time they appear in the text. Unless otherwise noted, the definitions are ad hoc, as used and understood by the author.

What is the Internet?

The Internet is a worldwide system consisting of people, information, and computers, a collection of tens of thousands of computer networks spanning the globe. Before the Internet there were other systems. Posted mail connected people across the street or around the world asynchronously; telephones made possible global, synchronous, two-way conversation; and one-way communication abounded through the technologies of radio, TV, newspapers, and books.

The Internet exists in a virtual (imaginary) place called *cyberspace*. The computer is the tool used to reach out to the Internet, the medium that carries the information. Every site on the Internet has a unique address and is located on a computer with a server program. The myth of the Internet is that it is a virtual, democratic, and open universe of uncensored, unevaluated information. *Caveat usor*!

What is the Web?

WWW has a new name: The Web. In the electronic universe, everything moves very rapidly. Names are changed with the press of a button and, almost instantly, everyone "in the know" uses the new name. WWW has been around since 1993 when *Mosaic* was introduced as an easy-to-use hypermedia system that operated in a graphical-interface mode with pop-up windows, pull-down menus, and point-and-click navigation (Pitter & Minato, 1996). *Mosaic* was to the Internet as *Windows* was to DOS, an opportunity to press a mouse button over a word group or icon instead of typing a command.

In late 1994, a program called *Netscape Navigator* virtually replaced *Mosaic* as a means of searching the Internet. *Netscape* installs easily, is supported by a professional software company, works well over conventional *modem* connections, and handles most of the services people use on the Internet. In addition, it is free to educational institutions and is easily downloaded and installed (Pitter & Minato, 1996). As we read this, *Microsoft's Internet Explorer* is giving *Netscape* a run for its money. The concepts of browsing are not unique to a specific brand name so that understanding the genre will not be limited by the browser in use.

The Web is a tool, or more precisely, a collection of tools for accessing *hypertext* information on the Internet. It is based on a *client-server* model. The client programs are the search engines that run on your computer and are called Web browsers. Browsers help users access information by opening connections to distant computers, sending user requests, and receiving and displaying results in the form of words, pictures, and links to other sources. These results may be read from the screen, printed on paper, or saved to a disk. The server programs are based in the computers upon which the resources are stored. Server programs are usually housed in powerful computers in order to handle information requests from many clients simultaneously (Pitter & Minato, 1996).

The metaphor for the Web is the book. The Web screen is called a *page*. It combines text, graphics, and links. Often, the page is longer than the screen and must be scrolled using the *elevator* located at the right of the screen. The first page of the site is called the *home page*. Many Web sites are home pages with links. Each page has its own *URL* (Uniform Resource Locator), a very precise address, unique to that page. There are probably more URLs than there are social security numbers. To access a home page, it is necessary to type the URL in the field to the right of the word Location, just under the toolbar. The computer language used to create Web documents is called HTML (hypertext mark-up language).

The Web has 200,000 sites, with the number growing geometrically on a daily basis. The need for tools to help people find what they are looking for has become increasingly important. Search engines, sometimes called Web guides, provide "online indexes" that operate on mouse clicks. Some of the more popular guides are Excite, InfoSeek, Lycos, and Yahoo! (Zuckerman, 1996).

What Equipment is Needed to Use the Web?

As noted above, a Web browser, typically *Netscape Navigator 2.0*, is a must. In terms of hardware, a reasonably fast computer (486, Pentium, or Mac equivalent) with a really big hard drive (1.2 million *bytes* or larger), and online access are all that is needed by many people. Flynn (1996) observes that relatively speedy 28.8 *kilobit-per-second* (*kps*) modems are necessary to avoid major frustrations waiting for pages to appear. Some of us need printers to download material that needs repeated readings.

At universities and large businesses, computers are connected to *local area networks*, which in turn are connected to a larger network that is connected directly to the Internet and the outside world (Hahn, 1996). In these situations, a Web browser is probably part of the available online software.

At homes and small businesses, computers are usually connected to the Internet using the telephone. In these cases, a modem acts as an interface between the computer and the telephone system, and a telephone line must extend from the computer to the telephone jack. A communications package usually contains the modem hardware, the telephone line, and the software program that must be installed on the computer to dial the phone. When your software dials a number, another computer answers the phone. Then, your program talks to a program on the other end and establishes a connection. The remote computer then provides access to the Internet (Hahn, 1996). When your work session is done, you break the connection by telling your communications program to hang up (pressing the disconnect key). It is possible to use a home phone number for connection. However, the phone is then "busy" when online.

If you live in a place that has had its area code changed, the culprit is online communication with some help from fax machines. So many people and businesses have requested additional lines to dedicate to online communication, that all possible seven digit numbers in a given area code were distributed. To accommodate the need for more phone numbers, new area codes had to be implemented.

Modems Are Not All Equal

Modems come in two types: internal and external. The original modems were external to the computer. They looked like rectangular boxes into which the telephone receiver was placed. It is possible that some upgraded version is still on the market. The modem of choice is internal—a card inside the computer with the phone connector accessible through the back of the computer. This is probably what you want.

Modems come in different speeds. Because the Web offers color images and, in some instances, sound and video, today's modem of choice has a minimum speed of 28.8 *baud*. All you need to understand about this is that with a slower rate, pictures and sometimes even words appear v-e-r-y s-l-o-w-l-y as they are transferred to your screen.

Anatomy of a URL Web Address

URL is an acronym that stands for Uniform Resource Locator. It is the combination of characters and symbols that make up the unique Web address needed to access a Web site. Precision is a must. One incorrectly typed keystroke and access is impossible. The Web never guesses or compensates for poor typing. Sometimes it is not the typing that is at fault. People often provide incomplete or inaccurate addresses, sometimes the requested site is not available at the time you request it, and sometimes the site no longer exists.

All Web addresses begin with http://. The acronym stands for *hypertext transfer protocol*. The :// is part of the protocol. The period simply denotes the end of the sentence. It is not necessary to memorize the words; just remember the code (http://). Following the // is typically WWW., then the name of the host computer and/or server computer, e.g. scis.nova, and a path name that shows where on the host computer the hypertext resource is stored (Hahn, 1996).

The punctuation marks found in URLs are periods (.), forward slashes (//), tildes (~), and colons (:). The trick is to type all the marks and characters as intended and get the address right. It is not necessary to understand how the protocols were developed.

Sites Worth Browsing

Roaming the Web is like window shopping. Flynn (1996) recommends that you start out without specific objectives in mind. New users tend to ask for good places to begin, or "starter sites." Annotated lists of Web sites are cropping up in the most unlikely places such as Hometown pages in local newspapers, teacher magazines, and advertisements in all formats. Abramson (1996) recommends a few URLs for teachers who are beginning their exploration of the Internet through the Web. Here are an eclectic assortment of sites you might try. The figures are printed Web screens. The URLs appear in the upper right corner and were printed with the screens. The home pages that appear on your screen may be different from the figures in the articles; many sites are constantly changing their pages. Hooray for electronic publishing!

If you are using *Netscape* on a modem, *Netscape*'s own home page will probably come up when you start the application. If you are working from a site that has its own home page appear first, to visit the *Netscape* Web site (see Figure 1), type

http://www.netscape.com

WELCOME TO NETSCAPE
NETSCAPE NEWS: MAY 9
Netscape has just unveiled six new versions of Netscape Navigator - Brazilian Portuguese, Dutch, Italian, Korean, Spanish, and Swedish - for users to download
Upgrade easily with Netscape Software Subscriptions ... Announcing Navigator Gold 3.0 beta ... Free server subscription with server purchase ... Navigator 3.0 beta released ... more Netscape News and My Page
NAVIGATOR GOLD 2.0, 3.0 BETA
Netscape Navigator Gold 2.0 and the just-announced 3.0 beta make it easy to create dynamic Web pages. Download Navigator Gold now, and check out the Gold Rush Contest winners to see Web pages created with Gold
NEXT GENERATION FASTTRACK SERVER
ZERO TO NET SITE IN MINUTES
WELCOME TO NETSCAPE!
U.S. ENGLISH SITE | FRENCH SITE | GERMAN SITE | JAPANESE SITE

Figure 1.

Linn Boswell is the Web master to be credited for the Eagle Ridge Elementary School in Phoenix, Arizona's Web site (se Figure 2). To get the full flavor of this site, it is necessary to visit it online. Linn is constantly updating the site. At the end of the site, find the date of the most current revision. Many computer coordinators and computer lab teachers look to Linn as their guru. Included at this site are Native American Indian (Web) Sites, Great (Web) Places for Kids to Visit, and (Web sites of) Movies for Kids. Teachers, put this site on your "must see" list!

http://www.primenet.com/~eaglerg

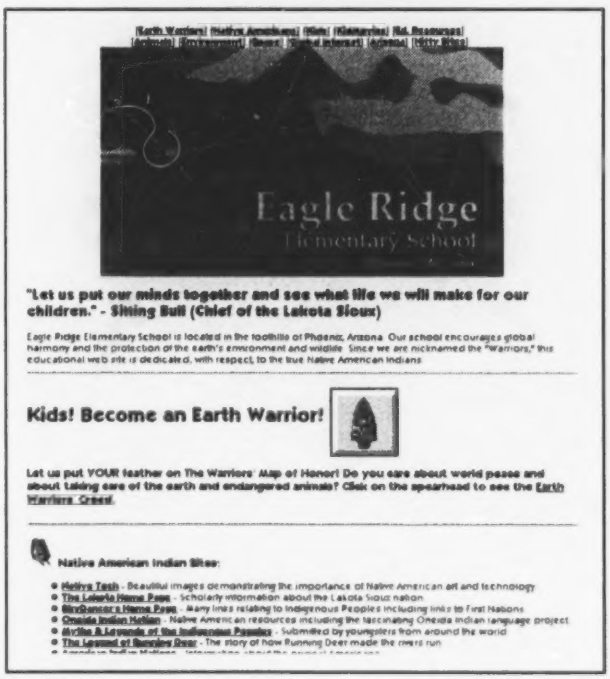
Eagle Ridge
Elementary School
"Let us put our minds together and see what life we will make for our children." - Sitting Bull (Chief of the Lakota Sioux)
Kids! Become an Earth Warrior!
Native American Indian Sites:

Figure 2.

The Internet Movie Database is a free and comprehensive source of movie information (see Figure 3). It is maintained and constantly updated by a team located in Mississippi State University. This site should be of interest to everyone who goes to the movies: It makes no strain on the brain.

http://www.msstate.edu/Movies

The Sloan Center for Asynchronous Learning Environments located at the University of Illinois at Urbana-Champaign fits under the rubric of academic research (se Figure 4). The goals of the project are to create efficiencies in the educational process (cost, time, and faculty productivity), increase student retention, and decrease time to degree. This one demands concentration.

http://w3.scale.uiuc.edu/scale/

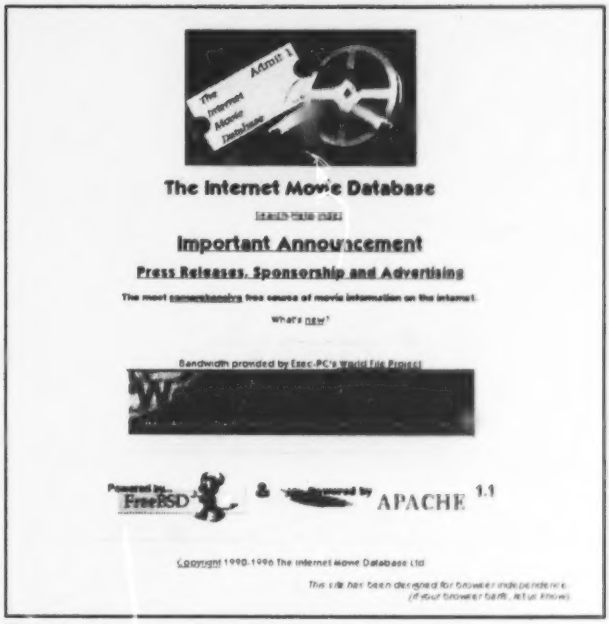

Figure 3.

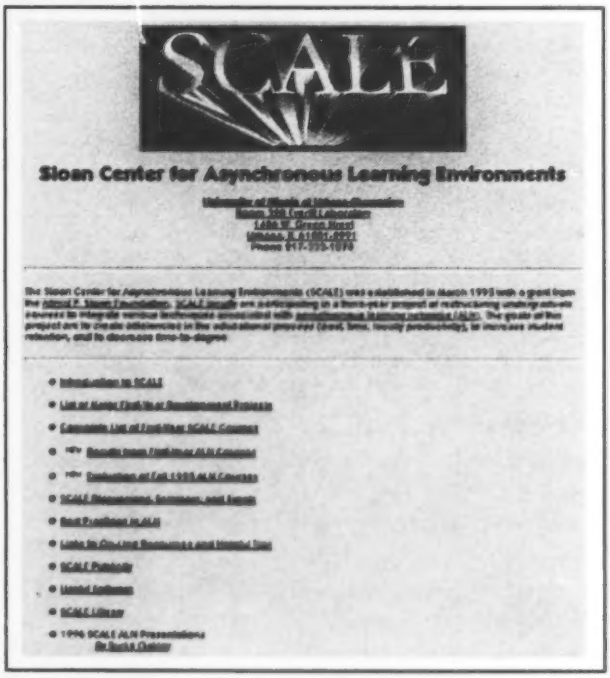

Figure 4.

Classroom Connect, a company that is moving very quickly to make connectivity a regular part of classroom teaching and learning has some very useful resources accessible through its web site (see Figure 5).

http://www.classroom.net

Figure 5.

The Eisenhower National Clearinghouse (ENC) is the nationally recognized information source for K-12 math and science teachers (see Figure 6). It is heartily recommended for classroom teachers, pre- and inservice courses in math and science methods, and generalists at all levels.

http://www.enc.org

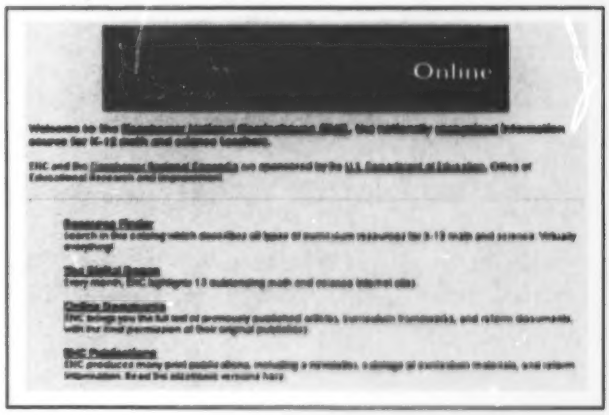

Figure 6.

A major site on the must-see list for all educators is the United States Department of Education (see Figure 7). A wide range of educational matters, including Department-funded programs, can be explored here.

http://www.ed.gov

To end the list on a light note, visit Discovery Channel Online (see Figure 8). If you use Discovery Channel tapes or cable presentations in your classroom, this site will open new vistas.

http://www.discovery.com

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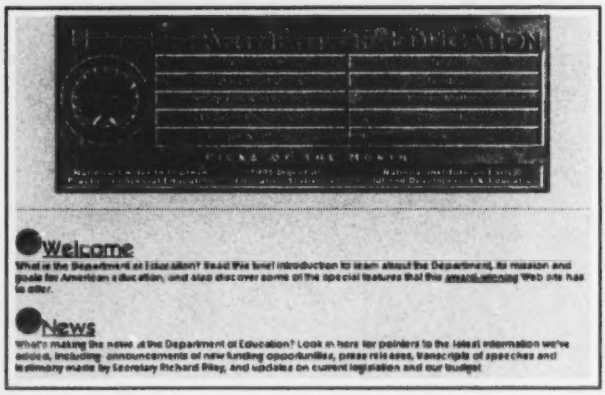

Figure 7.

Figure 8.

Conclusion

The Web is not a place for techies; it is a place for everyone. Most of us have never given any thought to how the picture gets into the television or what keeps a boat from sinking. Becoming comfortable with the Web is simply a matter of repeated exposure; it gets easier each time you board. Many people develop needs to mount their own Web sites; others are required to do so by their jobs. In any event, begin as a browser. What is to be done with the information accessed is today's homework for everyone. Williams (1996) has some suggestions for teachers in this issue. For information on how to develop a Web site, see Boling and Kirkland (1996), also in this issue.

References

Abramson, T. (1996). Letters. *HyperNexus: Journal of Hypermedia and Multimedia Studies, 6*(3), 27.

Boling, E., & Kirkland, S. (1996). Helping students design World Wide Web documents: Part I. *HyperNexus: Journal of Hypermedia and Multimedia Studies, 6*(4),

Glossary

baud—See kps.

bps (bits per second)—A measure of the speed of transmission of bits of information.

browser—See Web browser.

byte—Apace reserved for a character (number, letter, symbol, or space). A one-million-byte hard drive will store one million keystrokes.

caveat usor—A bit of literary license on caveat emptor (let the buyer beware) that means "Let the user beware."

client-server—The software configuration in which there are two parts to the program: the server, which holds the data, and the clients, which can query and retrieve the data from the server. It does not matter if the client and server reside on the same or distant machines (Pitter & Minato, 1996).

cyberspace—A metaphor to describe the virtual space in which the Internet exists. Also known as the Information Superhighway and the Infobahn. Hahn (1996) calls all these terms words to avoid. He prefers "the Net" (metaphor undefined).

elevator—The up and down arrows and the little square box that move the page up and down, located at the right of the screen; an excellent metaphor.

home page—The first screen that comes up at a Web site.

hyperlinks—Same as links. See links.

hypertext—Text that jumps to other resources, such as a definition, another page at the Web site, or a different Web site as far away as another continent.

HyperText Transfer Protocol (http)—A protocol is a set of rules, in technical terms, describing how something should be done. Http is a protocol used on the Web to transfer hypertext documents (Hahn, 1996)

Internet—A vast, worldwide system consisting of people, information, and computers, often referred to as the Net.

kps (kilobits-per-second)—Speed of transmission of data; the bigger the number the more natural the transition.

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Flynn, M.K. (1996, April 29). Taming the Internet. *U.S. News & World Report, 120*(7), 60–64.

Hahn, H. (1996). *The Internet complete reference* (2nd ed.). CA: Osborne, McGraw-Hill.

This an 800-page tome that contains just about everything on the subject. Written for adults with a sense of humor, it is comfortable to use and contains a comprehensive glossary and a huge, organized catalog of resources, a.k.a. yellow pages.

Pitter, K., & Minato, R. (1996). *Every student's guide to the World Wide Web featuring Netscape Navigator 2.0.* NY: McGraw-Hill.

This is a short (less than 150 pages), easy-to-follow introduction, with glossary, written at a ninth-grade reading and comprehension level.

Williams, P. (1996). Web wanderings. *HyperNexus: Journal of Hypermedia and Multimedia Studies, 6*(4),

Zuckerman, L. (1996, April 9). Nynex and Tribune Company buy stakes in Internet ventures. *The New York Times*, p. D4.

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Glossary, cont.

links—Underlined words or groups of words that, when clicked, transport the user to another resource. Icons or buttons are also used as links.

local area network—Often referred to as its acronym, LAN. A network within a limited range to which computers are directly connected with some sort of cable.

modem—A device that makes it possible for computers to communicate with telephone lines. Technically, a modulator/demodulator, a translator from analog (phone) to digital (computer) and back. Today's modems are usually located on boards inside the computer box attached to the phone jack by telephone wire.

online—Attached to telephone lines, directly or through networks; sometimes written as on-line.

page—A scrolling Web screen. Web sites are made up of pages.

URL (Uniform Resource Locator)—The combination of letters and characters that make up the Web address. The code used to locate a Web site.

Web browser—A generic term for a client program that allows the user to search for information on the Internet. Think of shopping: May I help you? No, thank you. I am just browsing.

Web master—A person considered an expert at constructing and maintaining a Web site; a Web guru.

World Wide Web—The old name for the Web (Hahn, 1996).

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Web Wanderings

by Paola Williams

Earlier this year, I designed a workshop for educators on how to integrate the use of the Internet into social studies and science classrooms. I thought I would take this opportunity to share some of the key points in those workshops.

The majority of the materials I used came from various sources found on the Internet. Many of them are well-known resources that have been handed down from computer teacher to computer teacher. My intention is to share not only the content of my presentation, but also the model for developing your own lessons and curriculum. By pulling together the following information that is readily available in many places, I hope I have offered you a way to organize the materials and use them as your own resources. Most of the information below has been successfully implemented in many classrooms around the world. Thanks to all those good people who shared it with a college.

Getting Started With Online Projects

Where to Find Projects

A good first step is to join an Internet project run by another teacher, school, or organization. Shop around on the Internet, you'll find postings called "Call for Collaboration"

Visit educational mailing lists called listservs, they broadcast e-mail to users who subscribe to them. Some operate as interactive discussion groups, others are like e-mail magazines. Subscribers receive new postings via e-mail, and post their own replies via e-mail.

To subscribe, you must know the name of listserv, and then e-mail to it a subscription request. Listservs generate a lot of e-mail. As you find those that you like you can unsubscribe to others. Some may post 50–60 messages a day, so beware!

Also subscribe to educational technology journals like *Classroom Connect* and *Learning and Leading With Technology*.

Types of Projects

Correspondence-Keypal Relationships

The IECC (International E-mail Classroom Connections) mailing list posts requests for keypals from educators around the world.

Information Gathering

Requires students to reach goals or solve problems using telecommunications. Involves collecting/exchanging data or creating/responding to questionnaires. The Global Grocery List project involves students around the world exchanging the prices of products in their communities.

Competition

Involves students in a contest of some kind. The Internet Scavenger Hunt is an information-gathering project through which students must search the Internet to answer questions or solve problems. The winner is awarded with online recognition.

Writing

Joint writing activities in which one class starts a short story, then passes it on to another class that develops the story, and so on. Other themes include literary criticism, essay writing, collaborative novels.

Online Conferencing

Allows students to communicate in real time via Internet Relay Chat or *CU-SeeMe*.

Hands On

Gets students involved in "real world" activities. Most activities occur outside of an Internet setting, with classes reporting their activity results or research findings to other classes.

After you've tried a project, it's time to think about designing your own.

Call for Collaboration: Designing an Online Project

The following 12 steps will help you blend your teaching goals with telecommunications projects (adapted from the Global SchoolNet Foundation).

1. List the skills you want to teach or enrich in your students, such as critical thinking, writing, or teamwork.
2. Identify the type of project you will be designing.
3. Go online to see how other teachers are structuring their projects. Use listservs to view a variety of projects. Design all details.

4. Revisit your curriculum and teaching goals to come up with the type, topic, and content for your project.
5. Design your project with specific goals, tasks, and outcomes.
6. Set specific beginning and ending dates for your project, and set precise deadlines for participant responses. Make a time line of important deadlines and dates. Give plenty of lead time between your announcement of the project and its launch.
7. Give your project a small-scale test run with a colleague at your school. This helps identify problems in the project concept or design.
8. Use a standard template for the "Call for Collaboration." Build in some kind of payback to your contributors. This could be sharing all of the data or written works collected during the project.
9. Post your first Call for Collaboration five weeks before the starting date. Repeat your call two weeks before the starting date. Send your posts to all of the mailing lists that are appropriate for your project. Post to commercial services like America Online, eWorld, and CompuServe.
10. Enlist and train responsible students to be part of your project "staff." Planning comes first.
11. At the project's conclusion, share the results of the project with all participants.
12. Reflect on what went right and what went wrong. Have your students write a summary of the project.

Useful Sites to Start your Journey

Integrating the Internet
http://www.indirect.com/www/dhixson/

Eric National Information Center
http://ericir.sunsite.syr.edu/

WebEd Curriculum Links
http://badger.state.wi.us/agencies/dpi/www/WebEd.html

Social Studies Links
http://www.indiana.edu/~ssdc/internet.html

GNN Education Center
http://gnn.com/gnn/meta/edu/

Intercultural E-mail
http://www.stolaf.edu/network/iecc/

National Council for the Social Studies
http://www.ncss.org/online

Grolier, Inc.
http://www.grolier.com

Global School Network
http://gsn.org

KidScience
http://kapalua.mhpcc.edu/~gima/kids

A Teleschool Program for fifth and sixth graders delivered by Distance Learning and Technology, Hawaii Interactive, the University of Hawaii, and seven Hawaii cable companies.

Students for the Exploration and Development of Space
http://seds.lpl.arizona.edu/

Virtual Frog Dissection Kit
http://george.lbl.gov/ITG.hm.pg.docs/dissect/info.html

Other Science Sites Listed
http://www-hpcc.astro.washington.edu/scied/science.html

Classroom Connect
http://www.wentworth.com/classroom/scilab.html

Eisenhower National Clearinghouse Online
http://www.ec.org/

This is just a starting point for exploration. Most of the URLs listed will lead you into a labyrinth of sites. Use them as a jumping-off point for your own discoveries and then share what you find with a friend. Better yet, write an article for *HyperNexus* and tell us all about your journey.

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Helping Students Design World Wide Web Documents

by Elizabeth Boling and Sonny Kirkley

What are the primary design issues to consider in the process of authoring for the World Wide Web? During the past 18 months the authors have conducted multiple Web design workshops with K–12 teachers, school administrators, college faculty, and technical staff from schools. We also teach novice Web designers, develop Web documents and sites, and study the design guidelines emerging from the Web community itself. From all these sources, we have assembled a list of design issues, which is evolving even as we write. In this article we present a snapshot of that list to assist authors who are just jumping "onto the Web."

"Part I: Planning and Designing the Site," in this issue, helps new developers get ready to publish on the Web. "Part II: Designing and Maintaining the Pages," which will appear in HyperNexus volume 7 number 1, addresses the design of actual documents, or pages, for the Web and includes some tips on making a Web site easy to maintain once it exists.

Part I: Planning and Designing the Site

The relative ease with which students and teachers can author documents for the World Wide Web (WWW) is deceptive. It's very easy to "get a page up on the Web," but once we have created more than two documents linked together we either have to face some critical design decisions or we end up with a snarl of files and links that can take forever to straighten out and that confuse the people who visit the site in the meantime. Only a year ago teachers and students could publish in relative anonymity, confident that only a few people might be likely to visit their sites; with the advent of powerful indexing robots and search engines however, the tiniest site is likely to be visited far more often than one might suppose.

The Design Process

No matter how helpful a list of issues for design might be, it is difficult, if not impossible, to consider and respond to every item on such a list at the same time. The issues presented here are best understood within the framework of the process model in Figure 1. Our model takes the view that "design" consists of multiple interrelated components (e.g., content design and technical design) that are influenced by decisions regarding the goals for the Web documents. Evaluation occurs throughout the process, so that designers may find themselves moving up and down the model in response to the results of evaluation instead of moving through the model in a step-by-step fashion.

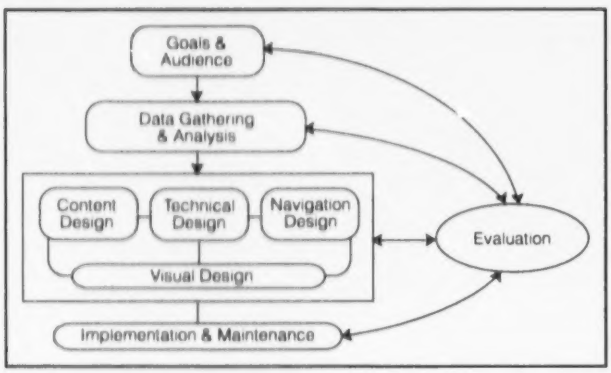


Figure 1.

Novice designers, especially students, frequently approach a project from the middle of this model; for example, a student may respond positively to an existing Web site because of its "cool graphics" and decide to produce a site "just like that one." It's usually counterproductive to force a student back up to the top of the model, but we can ask students to make a simple analysis of the sites that have captured their interest, using the model to guide them. They can ask and answer the following basic questions.

- Who is the target audience for the site?
- What were the developers of the site trying to provide for that audience?

With the answers to these questions in hand, the students can determine which design elements they should mimic and which they should adjust to make a better match with their own purposes.

Goals and Audience

Define the Audience

Constituents

Students are frequently members of the primary audience for their own published material. They are usually insightful about the characteristics and needs of the student members in their audience. Other members of the primary audience for a classroom-based Web site might include teachers and students in other classrooms across the world, relatives of student developers, and professionals who are interacting with students via the Web in a particular content area (like creative writing). Collectively these audience members may be thought of as the *constituents* for the site, because it will be primarily for their needs and convenience that the site will be designed. Students need to recognize that their primary audience is probably broader than simply "other students like me," and they shouldn't forget that all Web developers have at least two other audiences: *stakeholders*, and *the rest of the world*.

Stakeholders

Stakeholders are all of the people who may be directly affected by the existence of the documents within a site and those who might be in a position to affect what goes into those documents. Participants in our workshops usually identify stakeholders as school administrators, community members with an interest in the schools, anyone whose work is referenced or reproduced in the site, anyone whose picture or name is used in the site, and any technical support people who will be responsible for helping develop and maintain the site. Students may not realize what a large group of stakeholders they have and may not be eager to consider the wants and needs of stakeholders while they are designing. Bringing in several (enthusiastic) stakeholders to view early design efforts can build awareness and acceptance of stakeholders with students—and help build goodwill with the stakeholders too.

The Rest of the World

Participants in our latest workshop confirmed that even their brand new school-specific sites were being visited from literally all over the world and that they were finding themselves linked to central "lists of links" (like the Yahoo Directory). A brief search of the Web for "kids" or "students" will reveal multiple sites devoted to finding and publishing links to student Web documents. Although the prospect of a worldwide audience is exciting for novice Web developers, it brings along a responsibility most students have not yet had the opportunity to face—once published to the Web their work will represent of themselves, their schools, their communities, and even their countries in the eyes of a very wide audience.

Goals

Once they have seen the World Wide Web, many students have no trouble coming up with a goals statement (e.g., "I want to be on the Web!"). The following two questions can help students sharpen their goals for creating Web documents.

1. What will you put into your documents? (Do you have it? Will you have to make it? Collect it? Scan it?)
2. How will your audience use those documents?

Participants in the authors' workshops usually find it helpful to discuss these questions as a group because no one person ever seems to think of as many useful, "obvious" answers as the group can. Students will find their perspective similarly extended when they discuss design goals in a group.

Practical Data Gathering and Analysis

Goal setting is fine, but what if we simply don't know how people might use our documents or what information might be most useful to our audience? At this point a little practical data gathering is in order.

Interviews

Students identify representative constituents and stakeholders and conduct open-ended interviews with them find out what their audience wants to see and how they might use the information. They should plan these interviews ahead of time, developing between 5 and 10 primary questions and some follow-up questions—the ones to ask in case the subject does not talk at length.

The questions will vary, but they should offer as much opportunity as possible for variety in the answers. The question "Which would you prefer to see on the Web—student art work or news articles by students?" will not yield as much helpful information from interview

subjects as the question, "What type of student work do you usually enjoy seeing?" Follow-up questions for this one might be, "What do you enjoy about looking at that kind of work?" and, "When you look at that work, what else do you want to know about it?"

Analysis

When they have their data in hand, the students' next task is to organize that data so it can guide their design process. It's important to have the students look for patterns in the data rather than simply having them count up answers and try to make decisions based on numbers. Easy patterns to detect may be:

- Very similar answers to a question.
- Very different answers to a question.
- Surprising answers; the ones they didn't expect.
- Answers everyone expected to hear.
- Emotional answers ("I love to look at pictures" or "I really hate it when I can't find out when something was made").

The process of sorting answers into these kinds of patterns helps student designers become familiar with their audiences. Once the data are sorted, students can create 2 or 3 simple "characters" who are assembled by inference from the data. In a recent project one of the author's student teams created a character named "Desperate" who needed some information for use in a class, was liable to give up on the search very easily if it seemed too difficult, and was liable to do poorly in the class if he didn't find the right information. A second character, "Motivated," was mainly interested in technology, but would study information if it looked interesting and get impatient quickly if she didn't find something new to look at. The team used these contrasting characters throughout their design process to ask themselves whether their design decisions were going to "help Desperate" or "hinder Motivated." Creating characters helps students identify the relevant parts of the data they have collected, relate that data directly to their designs, and remember to apply the data throughout the process instead of collecting it and then forgetting it.

Content Design

The decision to meet certain goals for certain users does not automatically take care of the content issues for a site. With their lists of proposed content in hand, student designers will need to address the ways in which that content can be divided into pieces, or *chunks*; the way those chunks are connected, or *linked*; and whether or not some of the content should be included at all.

Chunking

How much content should go into a single Web document? Web users don't like to scroll through documents, but restricting each page to "a screenful" of content results in "chunks" of content that are so small the user has to do a lot of clicking in order to see anything very useful. It's a better idea to put related content together on a page and look for natural "break points" when the size of the document becomes difficult to edit or begins to take a long time to load when accessed through the Web.

Designers use two strategies for organizing information conveniently on a long page. The first is to ensure that even part of a line of text shows at the bottom of the page, as a clue that the whole document is not showing (test this on multiple browsers). The second is to create a list of internal links at the top of the document that connect to locations further down in the same document instead of to a new document. Including a "back to the top" link makes it easy for a user to browse several sections of content without having to load a new document in order to do so.

Linking

When a document is full of links, users have a hard time deciding which ones are going to be fruitful, so they may choose not to follow any—and once a user has linked away from a document, there is a real possibility she won't come back to it. In making decisions about links, student designers should refer back to the characters they invented during data analysis and ask themselves questions like, "Why would So-and-So follow this link? Would it be helpful for him? What if he never came back—would that be OK?" If they have to define the connection between one document and another in terms of the audience, students are likely to include meaningful links rather than frivolous ones.

Eliminating

What content should *not* be included in a Web site? Here are some examples:

1. The content changes so frequently that maintaining currency takes more time or money than this

organization or individual can afford. Are the students considering posting reviews of cafeteria meals every day? Who is going to be responsible for posting those reviews? If there are enough computers available to enough willing hands, such a design can work. Otherwise, it should be reconsidered.

2. The content is urgent; people will need to see it right away, and might miss it if the Web is the only place it appears. The Web does not automatically reach out and tell users that new information is there. If users don't browse the site on a regular basis, designers cannot presume that they are seeing newly published information right away.
3. The content will bring unwanted attention to an individual or elicit many responses which must then be handled by someone in the organization. If users are invited to contact an expert whose name is given in a document or requested to send in comments about a site, someone will have to manage the resulting response. Students need to be aware of this issue and plan for the resources to manage whatever the consequences are.

Levels of Information

Balance is the key to making decisions about the number of levels a site should contain (see Figure 2) and what information should appear at each level.

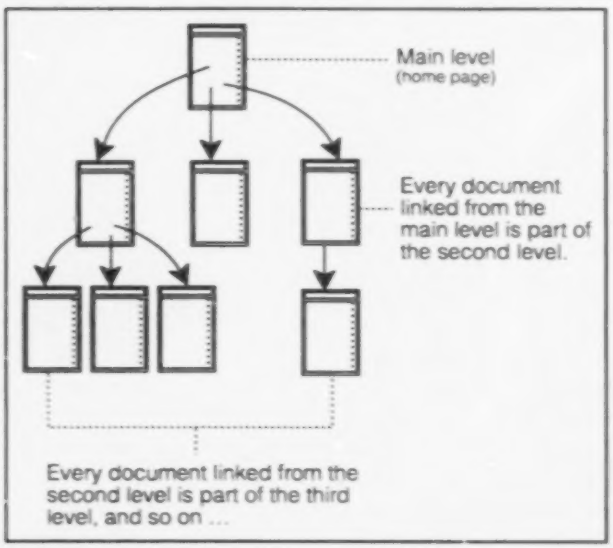

Main level
(home page)
Every document linked from the main level is part of the second level.
Every document linked from the second level is part of the third level, and so on ...

Figure 2.

Ideally users will be able to access as much of a site as possible from the main entry point, what we have been calling the "main document." If this principle is followed too strictly though, the main document can become an unwieldy list that isn't useful for anyone. On the other hand, creating a new level for every possible subdivision of content leaves users clicking on link after link without arriving at anything useful. The rule of thumb that seems to work is this: The users of the site should be able to decide within three links from the main document whether they are close to finding what they want. For sites that are getting fairly large, students can make index cards that represent their primary content elements and experiment with reorganizing the cards until they have satisfied the three-link rule.

Source and Currency of Content

Copyright and Plagiarism. Some guidelines concerning the use of other people's content are the same for Web documents as they are for book reports and term papers. Unattributed quotations constitute plagiarism, period. Other rules are more strict than most regular classroom guidelines; for example, scanned images that are taken without permission from copyrighted sources may be included in a one-time, unpublished school report, but they are not acceptable for use in documents published to the Web because the Web is an international publishing medium. These rules are easy for students to forget when the technology makes it easy to copy text and graphics directly from screen and paper sources. Students *must* understand the serious implications of using material for which they do not own the rights. Think of creating Web documents as international publishing, and encourage students to do the same.

Personal Exposure. In addition to copyright issues, students should observe several cautions when they use photographic images in Web documents. First, create a release form (see Figure 3) and use it any time they include scanned photographs of people in their documents.

Second, obtain permission from students' parents or guardians before students put photographs of themselves (or full names, addresses, phone numbers, or other personal information) in their documents. The Web is a worldwide publishing medium and everyone has the right to refuse such exposure for themselves or their children.

Users need as much information as they can get about the source of the information they're getting from the Web; it is the responsibility of information providers to identify themselves as clearly as possible to users. This includes offering a contact name or e-mail address to

Photograph Release Form for Parents

The signature below indicates my permision for [name of school] to publish the photographic likeness of my child, [child's name], on the World Wide Web as part of the [name of project].

The photograph will be used as part of an educational project only and the document in which it is published will contain a notice prohibiting copying of the photographs contained in it.

The permission is valid as long as the original project remains published on the Web. This permission is only valid for the specific project named in this release form.

I have received a copy of this release form.

Signature: _____

Address: _____

Phone: _____

Date: _____

General Photograph Release Form

The signature below indicates my permision for my photographic likeness to be published on the World Wide Web as part of the [name of project].

The photograph will be used as part of an educational project only and the document in which it is published will contain a notice prohibiting copying of the photographs contained in it.

The permission is valid as long as the [illegible] project remains published on the Web. This permissio[illegible] valid for the specific project named in this release fo[illegible]

I have received a copy of this release form.

Signature: _____

Address: _____

Phone: _____

Date: _____

Figure 3.

which users may address questions concerning the content of a document. It is also important to indicate the last time a document was updated, so that users know how current the information in that document may be. All this information is frequently included in a standard footer for every document in a site. (Figure 4 shows standard header and footer elements.)

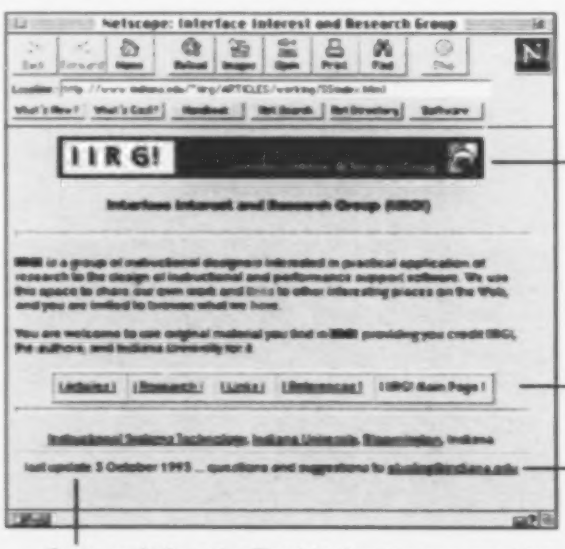
Resources on the Web

The Web itself offers many resources to designers, and students can become familiar with the primary issues by doing something they enjoy anyway—surfing the Web. The following list of URLs will help you target design-oriented resources.

Style Guides

http://info.med.yale.edu/caim/StyleManual_Top.HTML

This online manual describes the design principles used to create the pages within the Center for Advanced Instructional Media's (C/AIM) World Wide Web site. The manual includes a great explanation of the "whys" behind the principles.



Visual identity symbol: This symbol appears on all the pages in this site.
Landmark graphic: This graphic appears on all the major access pages of this site.

Navigation bar: This bar appears at the bottom of every page in the site—the link to the current page is not active because we're already there.

Source of information: This link allows users to send electronic mail to the maintainer of the site.

Currency of information: The date of revision appears at the bottom of every document.

Figure 4.

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http://www.indiana.edu/~wwwdocs/guidelines.html
The Indiana University Bloomington Style Guide is a great example of minimal guidelines developed by a diverse community of Web designers. These standards are presented in an especially straightforward style.

http://www.ithaca.edu/web_admin/IP/ip_handbook/design.html
Ithaca College's online Information Provider's Handbook contains a very thorough Style Guide section. Some of the information there is, of course, specific to Ithaca, but the guide is a good example for site developers to follow and contains a lot of helpful guidelines.

http://www.wsdot.wa.gov/Webmaster/WebDesign/guide/
For a look at the guidelines for Web design published by a government organization, try the Washington State Department of Transportation.

http://www.np.sg:9080/html_design.html
Ngee Ann, a commercial Internet provider, publishes these straightforward guidelines for Web page design.

Search Tools
http://www.altavista.digital.com
You'll need a forms-capable browser to use this search facility (*Netscape*, *Mosaic*, and *LYNX* are all forms-capable). Enter one or several terms and get back a list of links from all over the Web. This is a good way to find out how visible your site is to everyone in the world!

http://www.yahoo.com/Education/K_12
Still one of the friendliest and most complete indexes on the Web, Yahoo maintains extensive lists of education-related sites and actual school sites. From this K–12 page you can backtrack to all their education listings.

Resources for Web Developers in Education
http://cee.indiana.edu/surf.html
The Center for Excellence in Education (CEE) at Indiana University maintains a page of Web resources for educators that is used by the hundreds of educators who attend workshops in the Center every year.

http://cee.indiana.edu/workshops/design_server.html
Also in the Center for Excellence site, this page was created specifically to support educators attending the workshop on Web site development. Look here for tools to make Web development easier.

http://www.indiana.edu/~iirg/ARTICLES/articles.html
The Interface Interest and Research Group (IIRG!) at Indiana University has published several presentations on visual design for the World Wide Web. Visit this site for updates to the information in this article.

http://www.indiana.edu/~eric_rec/comatt/websites.html
The ERIC Clearinghouse on Reading, English, and Communication offers a huge page of resources links to Web sites of interest to teachers. Some of them include specific resources applicable to Web development and many of them demonstrate the kind of Web development that teachers and students are doing.

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So You Want to Be an Author?

Beverly Simon

The Target Audience

You're an educator, teaching at both the high school and college levels, and you want to use authoring software to help you develop classroom lessons and computer-based training applications for the courses you teach. Your aspirations to become an "author" are reinforced by your knowledge that "multimedia gives teachers instant access to thousands of slides, videos, sound tracks, and every lesson plan they ever wrote," and that "average learning time has been reduced significantly ... and achievement levels are more than a standard deviation higher" when multimedia is used effectively in education (Hofstetter, 1995, pp. 46–47). Your experience on computers is limited but you do know something about the PC environment. You are familiar with *Windows 3.1* and you're most comfortable with them and do not want to learn a new operating system in addition to an authoring tool, now what?

Steps to Becoming an Author

"In our age of information overload, the benefits of superb imagery and high-fidelity sound become increasingly clear; they allow us to experience information rather than simply acquire it.... But how do we get from here to there?" (Raskin, 1990, p. 152). To satisfy the requirements of authoring systems you must design and build an authoring environment, which is "the total set of hardware, firmware (software that is permanently built into the hardware), and software used for authoring" (Luther, 1994, p. 6). The hardware and software selected in building your environment must allow you to create the applications you want with the skills you possess. They must be within your budget and access to technical support must be available to assuage any fears you have about using them.

Authoring Environment—Hardware

"The Multimedia PC (MPC) refers to IBM-compatible PCs that meet minimum specifications, based on those set by the MPC Marketing Council. The MPC Specification ensures compatibility between the hardware and software used in *Windows* multimedia" (Perry, 1994, p. 16). Although this specification is acceptable for running multimedia applications in a *Microsoft Windows* environment, it is suggested that to develop multimedia-based applications a more powerful unit is required. To this end consider the following hardware, which augments the specifications as set by the MPC Marketing Council, in designing your authoring environment, as recommended by Perry (1994, p. 18):

- 486-based computer system running at 66 MHz.
- 16MB RAM.
- 1 gigabyte (GB) hard disk drive.
- Quad-speed CD-ROM.
- 16-bit stereo sound card.
- VGA display capable of 65,536 colors at 640 x 480 resolution.
- Mouse.

Luther (1994, p. 42) suggests purchasing a computer with an ISA-bus system as found in most PC clones on the market. The IBM PS/2, with its microchannel architecture, is more expensive and may limit your choices of peripheral equipment. Verify that your computer system has at least five or six open interface slots to add new peripheral devices and a 150 watt or larger power supply to support them. When considering the CPU chip and speed of your system "the basic rule for multimedia development hardware is the faster the better/the more the merrier" (Perry, 1994, p. 18). "The Intel 486 chips ... contains 1.2 million transistors on a chip no bigger than a book of matches.... Though many of the software packages on the market will run on older 386 machines, if you are serious about multimedia production, you should consider as a minimum a machine powered by a 486SX chip" (Lindstrom, 1994, p. 52). By selecting a 486-based computer running at 66 MHz, you'll be able to run new multimedia applications in an acceptable time interval.

Random access memory, or RAM, is the volatile storage area where your program resides while the CPU is executing it. "In essence, RAM is where an application, such as an authoring program, is loaded and resides while you are authoring. It is also where the text, graphics, audio, animation, and video are stored as they are being created" (Lindstrom, 1994, p. 52). As

RAM is filled, the data being processed is written to hard disk to be stored temporarily. This process slows the execution of the application program. "The computer business has a saying: You can't be too rich, too thin, or have too much RAM. That adage is particularly apt for multimedia development, where the programs are large and the memory requirements for the media files often run into multiple megabytes" (Lindstrom, 1994, p. 53). It is suggested that computers running *Windows '95* have 16 MB of RAM to run efficiently (Venditto, 1995, p. 82). Consequently, it is strongly advised that professional presentation developers' systems have 16 MB of RAM especially if you are running more than one application at a time. Although a faster CPU will always improve the performance of an application, additional RAM is only useful if the application uses it. More than 16 MB of RAM at this time is not necessary since no commonly used applications require it (Luther, 1994, p. 45).

"The speed and capacity of hard disk drives make them the most desirable development and delivery format for multimedia" (Lindstrom, 1994, p. 58). A gigabyte hard drive is suggested because multimedia data usually occupies large amounts of storage space. "No matter how much capacity you get, you will eventually run out as your library of multimedia software grows" (Hofstetter, 1994, p. 140). Although a Small Computer System Interface (SCSI) hard disk drive would be optimum because of its increased speed and chaining ability, it is expensive in relation to an Integrated Disk Electronics (IDE) drive that will adequately support multimedia.

"CD-ROM drives, while far slower than hard drives, are a required standard for MPCs ... Their large capacity is useful for storing and distributing software, clip media, or productions that demand volume" (Lindstrom, 1994, p. 60). Confirm that the CD-ROM you purchase can play audio as well as read data and that it matches the CD-ROM drive controller interface on your sound card. Mann (1994, p. 58) suggests that you use a SCSI interface controller "because it's industry standard and it allows you to swap the drive or sound card at any time for newer, better hardware."

"Sound is the one media type that almost everyone agrees qualifies a presentation as multimedia" (Lindstrom, 1994, p. 63). A multimedia PC requires a sound board that provides the ability for your computer to produce realistic speech and music. The audio board on your computer should support, in stereo, both WAVE audio and MIDI: "WAVE (wave form) format is used for general sounds and music.... WAVE sounds are digitized wave forms, generally compressed at some level, that can be stored to disk and replayed through a sound card with appropriate software" (Badgett & Sandler, 1994, p. 418). Musical Instrument Digital Interface (MIDI) "is the standardized designation for music files generated by digitally controlled musical instruments and devices" (Lindstrom, 1994, p. 298). A MIDI file can be much smaller than a WAVE file of comparable complexity and length because more of MIDI playback is handled by the MIDI hardware attached to your system (Badgett & Sandler, 1994, p. 418). The latest MPC specification requires a 16-bit sound card that produces a dynamic rage of 98 dB. "The greater the dynamic range, the more faithful the sound reproduction" (Hofstetter, 1994, p. 136).

Authoring Environment—Software

"The CPU and operating system go about their tasks invisibly within the confines of the computer cabinet" (Lindstrom, 1994, p. 60). In order for the user to see the results of the CPU's processing, the digital information in the computer must be converted to analog signals and displayed on the monitor. Graphics (video) boards, which control the monitor, are differentiated by the number of pixels and colors they can display. A pixel represents the little dots on the screen. The number of pixels displayed horizontally and vertically is called video resolution. Color resolution is measured in bits. "The 24-bit color boards are capable of displaying more than 16 million different colors, sufficient for reproducing photorealistic images" (Lindstrom, 1994, p. 61). For multimedia, choose minimum resolutions of 640 x 480 and 16-bit or 24-bit color boards. Keep in mind that greater color capacity requires more RAM and hard disk space as well as more processing. "If necessary, a graphics accelerator board, which takes over some of the graphics processing to free up the CPU, can be added to your system to speed the processing of large amounts of graphics information and improve display performance" (Lindstrom, 1994, p. 61). If you wish to incorporate motion video into your applications you will need a board that supports video compression and decompression as well. Motion is

"So You Want to Be an Author?" Slide Show

So You Want To Be An Author?

Presented by
Beverly Simon

Steps To Becoming An Author

- Define
  - Your Authoring Skills
  - Your Goals
- Build An Authoring Environment
  - Hardware
  - Software

Authoring Environment - Hardware

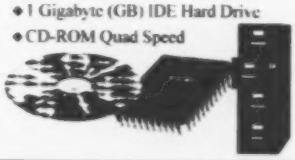
- 486-based computer system 66 MHz
- 16 MB RAM
- 1 GB hard disk drive
- CD-ROM quad speed
- 16-bit stereo sound card
- VGA display 65,536 colors at 640 x 480 resolution
- 17" monitor
- Mouse

Computer System

- 486-based computer system running at 66 MHz minimum
- ISA-bus system
- Five or six open slots
- 150 or larger power supply

Storage

- 16 Megabytes Random Access Memory (RAM)
- 1 Gigabyte (GB) IDE Hard Drive
- CD-ROM Quad Speed



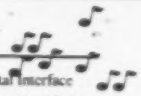
Sound

- 16-bit Stereo Sound Card
  - Supports WAVE audio and MIDI
- Wave audio
  - Digital audio that is the general term for any voice, sound effect, or music converted from analog form to digital
- MIDI
  - Standardized designation for music files generated by digitally controlled musical instruments and devices.

Wave - Digital Audio

- WAVE sounds are digitized wave forms stored to disk that can be replayed.
- They allow you to play any kind of sound.
- The quality of music of Wave forms will be consistent on every machine.
- The computer playing back your sounds must be capable of the recorded sampling rate and sample size.

MIDI



- Musical Instrument Digital Interface
- MIDI files are smaller than WAVE files of the same duration.
- MIDI relies on a synthesizer to play back the encoded music.
- MIDI requires a lot less power than Wave files for playback.
- MIDI does not record or play real-world sound effects (door slamming).

Video

- Graphics Video Board
  - 640 X 480 Resolution
  - 16-bit or 24-bit color
  - supports video compression and decompression
- 17 Inch Monitor

Authoring Environment - Software

- Operating System
  - Programming software that turns a collection of chips and circuits into a functioning computer.
- Authoring Software
  - Network compatible.

Operating System

- Windows 3.1
  - Sits above DOS
  - Provides a graphical user interface
  - Provides some multitasking
- DOS 6.0
  - Required for Windows 3.1
  - Offers improved memory management over DOS 5.0

Authoring Software

- Multimedia-Capable Presentation Software
  - Charting and graphing programs for slidemaking which may include electronic screenshow and multimedia functionality.
- Dedicated Media Integration Software
  - Designed strictly to import, edit, sequence, and play back multiple media types.
- Professional Development Software
  - Complex and costly tools used for authoring interactive consumer titles, and interactive courseware development.

Professional Development Software

- Macromedia's Authorware Professional
  - Received outstanding ratings for application quality by 200 users in a study conducted by Computerworld and First Market Research.
  - Offers an easy to use visual programming style.
  - Uses a flowchart metaphor to specify program flow.
  - Offers built-in programming capability, response judging and data collection.
  - Supports multimedia functions such as sound, animated movies, and video.

Network Compatible

- Check with your network system administrator and verify that:
  - The authoring software you select can run on your network.
  - Your network can support the features of the authoring software you want to use.
  - There is available space on your network for your authoring software.

Authoring Is

- You
- Your Goals
- Hardware
- Software

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achieved by capturing a series of successive video frames and playing them back more or less rapidly. This will work when incorporating short movies into a presentation but will not work for larger jobs. "At the U.S. broadcast rate of 30 frames per second, 1 minute of high-quality full-motion video requires something on the order of 2GB of storage. Without compression technology to squeeze this megabyte-gobbling imagery into smaller space, digital video is ridiculously impractical. Hence the importance of video compression and decompression" (Raskin, 1990, p. 156). Finally, choose at least a 17" monitor required by the high-resolution system designed for your authoring and make sure your computer system includes a mouse.

"The operating system refers to the programming (software) that turns a collection of chips and circuits (hardware) into a functioning computer" (Lindstrom, 1994, p. 56). The *Windows* environment on a PC would provide an excellent starting point, because you are already familiar with it. "*Microsoft Windows* is not technically an operating system—it is an extension module that sits above DOS. It provides a graphical user interface (GUI) and as much multitasking as can be accomplished with DOS still present" (Luther, 1994, p. 48). Although *Windows 3.1* can handle audio, motion video will require you to limit the other processing the system is doing simultaneously to attain an acceptable level of performance. Consider this when using motion video in your application. OS/2 is another operating system suggested for use with multimedia applications. "However, OS/2 requires more system resources and the number of software packages designed to run with OS/2 is fewer than for DOS" (Badgett & Sandler, 1994, p. 11).

"The purpose of authoring software is to simplify the inherently complex task of creating an interactive multimedia application" (Luther, 1994, p. 57). Before selecting an authoring tool, the needs and expertise of the user must be considered. "Choosing a presentation method for information dissemination is similar to performing a feasibility study. You must analyze your needs, develop alternative solutions and then choose the best solution for the situation" (Mueller, 1991, p. 104). You are a classroom teacher with limited computer skills who wants to design lessons and computer-based training (CBT) for the courses you instruct. "CBT applications can be authored with any full-featured assembly tool that supports interactivity, variables, and file I/O.... Assembly tools intended for CBT include features such as test building as an integral part of their authoring interface. *IconAuthor* by AimTech and *Authorware Professional* by Macromedia are two examples, which run under *Windows*" (Luther, 1994, p. 233). Classified as professional development software, these tools were voted first and second in satisfaction by over 200 users in a survey conducted by the Computerworld Database Division and First Market Research (Sullivan-Trainor, 1994, p. 74). Users in the study were primarily developing CBT, internal presentations, kiosks, or informational applications. These tools will allow you to develop almost any kind of test structure and use a "visual programming style and may be easier for some people to use.... [They] use a flowchart metaphor that lets you specify program flow by selecting and arranging elements on a project diagram" (Rosenthal, 1992, p. 60). If you expect to use your application for years, try to make sure the company supporting your authoring software will still be around.

An authoring tool that is expected to run on a network must be network compatible. Before making a selection, ask your network administrator to check with the manufacturer about the manner of installation of your authoring tool and the amount of RAM and permanent storage it requires on your system. Remember that "the high rates of multimedia, especially motion video, will ... tax these networks" (Luther, 1994, p. 254). Confirm that your software will perform as you anticipate on the network.

Conclusion

"It is now clear that multimedia is going to be one of the most important attributes of personal computing in the 1990s and beyond.... Although you will face significant challenges in applying multimedia to your needs, you will be positioned to grow as the market expands, and the rewards will be great" (Luther, 1994, p. 256).

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Designing an Individualized Testing Program: A HyperCard Application

Ronald F. Pauline

There are many individuals, along with a number of states, who are now beginning to emphasize self-paced, individualized, outcome-based education in which the students work individually toward a set of objectives or outcomes. When these are met, the student moves on to the next set of objectives or outcomes. Would a computer-based test offer many advantages when it is used in a class structured for instruction in individualized mastery as students work at their own pace to achieve these clearly specified objectives or outcomes? When a student is ready for testing, if it is part of a teacher's method for achieving certain outcomes, he or she can take the test on the computer.

Commercially prepared tests are widely available from a number of sources. These are generally based on a textbook series and they may or may not test for what you as a teacher feel to be most important (Bullough & Beatty, 1991). How can teachers thus find a computer-generated test that is "right" for their situation? Why not design their own? By combining computer test generation, computer test scoring, and computer gradebook applications into one integrated system, the testing, tracking, and reporting of student progress can all be automated (Merrill et al., 1992, p. 193).

Setting Up HyperCard

The first step in designing your own classroom test is to set *HyperCard* to Level 5, scripting. To do this, open *HyperCard* and the first card you will see is the Home card. Click the bottom left-hand arrow to the left of Welcome to ... and you will see the Preferences card.

Click in the block containing the choice, 5 Scripting. When this selection is highlighted, you will have set *HyperCard* to scripting, Level 5, enabling you to add script to all elements of the *HyperCard* Stack. Next click the right-hand arrow in the bottom left corner of the Preferences card, and you will now return to the original Home card. Select New Stack ... from the File menu, give your stack an identifying name such as Test 1 or Chapter 1 Quiz, decide where you would like to save your stack, and finally click on New. You will then see the first card of your new stack on the monitor.

Designing the Testing Program

The next step in designing the program is to name the card fields you will be utilizing in your program. Let's use the following names:

- Card field "corr" indicates total correct answers on the test.
- Card field "incorr" indicates total incorrect answers on the test.
- Card field "percent" indicates percentage of correct answers or percentage on the test.
- Card field "first" indicates student's first name.
- Card field "both" indicates student's first and last name.

We are now ready to set the card fields to 0 and erase the name of any previous user. To do this, select Card info from the Objects menu and you will see a dialog box indicating, among other information, the card name, card number, and card ID. Click on Script and you will see a scripting area where you can type in the scripting language. Type the following script (see Figure 1):

```
on openCard
  Delete line 1 of card field "first" of card
    id xxx
  put 0 into card field "corr" of card id xxxx
  put 0 into card field "incorr" of card id xxxx
  put 0 into card field "percent" of card id xxxx
end openCard
```

As can be observed from the script, when the first card of the program opens, this script will erase the name of the previous user and place 0s in the fields that show the student how many questions he or she has answered correctly, how many were incorrect, and what percentage he or she received on the test. Close the scripting area by clicking in the closure box and click on OK to

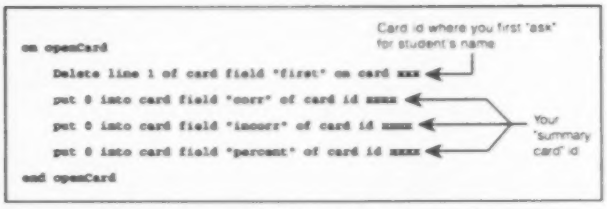
Card id where you first "ask" for student's name
on openCard
Delete line 1 of card field "first" on card xxx
put 0 into card field "corr" of card id xxxx
put 0 into card field "incorr" of card id xxxx
put 0 into card field "percent" of card id xxxx
Your "summary card" id
end openCard

Figure 1. Script to set summary card fields to "0" and explanation

save the script. You can now begin designing the first card, which will probably be your title card, other cards that may give the objectives of the test or the instructions, and any other cards you want.

Asking and Displaying a Student's Name

To ask the student his or her name and display it in the program, you must use the ask command. On the card where you want to first ask the student his or her name, again select Card info from the Objects menu, select Script, and type in the following script:

```
on openCard
  global name
  ask "Please type in your first and last
    name."
  put it into name
  put first word of name & "." into card field
    "first"
end openCard
```

In this script, global name will enable you to insert the student's name anywhere in the stack you choose, and, as you can see from the script, we are putting the student's first and last name into a designation called name. The word ask is a screen manipulation command that prompts the user to type a text response into a dialog box that appears on the screen. Whatever you place in quotation marks after the ask command will appear in this dialog box and prompt the student to type in a text response and click OK. The last line of script will put the first word of name, in this case the students first name, and a period following the name into a field we called first. Let's assume we want to ask the student for his or her name then on the same card say something like, "Hello, first name, welcome to a test on ..." To do this you should design a card similar to the one shown in Figure 2.

To insert a field, in this case "first," click on the field tool in the tool palette then select New field from the

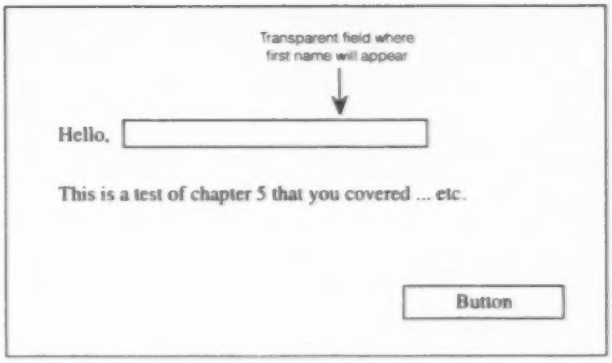

Figure 2.

Objects menu; an adjustable field appears on you card. Click on a corner of the field and drag inward until the size of the field is a little larger than what the first name will be.

Double-click on the field and you will see a dialog box as shown in Figure 3.

Here you will name the field "first," select the style of field (transparent), select the text style to match the text on your card, and click OK. Type in the introductory text, then move the field where you want the students first name to go. When the student types his or her name into the ask dialog box, it will appear in the transparent field and should look as if it is part of the regular text.

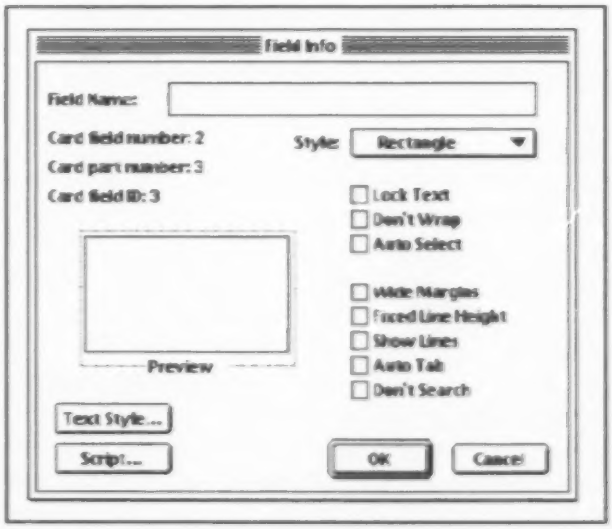

Figure 3.

To Put the Students Name on Any Other Card

On any card where you want to put the student's first name, such as if he or she answers a question correctly or incorrectly and you want to say something such as,

"Good answer, first name, the capital of Pennsylvania is indeed Harrisburg." You should proceed in a similar manner as described when asking for the student's name, with a minor change in script. The new script is:

```
on openCard
  global name
  put first word of name into card field
    "first"
end openCard
```

As you can imagine, you will need a transparent field named "first" on this card.

To Put the Student's First and Last Name on Any Card

There may be an instance where you might want both the first and last name of a student to appear on a card, for instance on a summary card (as described later in this article). Proceed as you did to put the student's first name on any card, modify the script as follows:

```
on openCard
  global name
  put name into card field "both"
end openCard
```

Designing the Questions

Once you have designed the title page, introduction page (with first name if you wish), and directions on how to take the test, you will then want to ask the questions themselves. You have a myriad of choices of how to proceed. After a student selects a choice, you can have that button link to a page that tells the student if he or she answered that question correctly or incorrectly, you can link to a page that does nothing more than say thank you for the answer and let's go on to the next question, or you can say nothing and just link to the next question. You can add a specific effect (from the button dialog box) for each correct answer and a corresponding specific effect for incorrect answers. You may even use a sound mover to add specific sounds for each correct or incorrect answer. However you decide to proceed, you should add a provision to your button scripts to add 1 to the field "corr" or "incorr" on your summary card. A typical question design and scripts for correct and incorrect answers is shown in Figure 4.

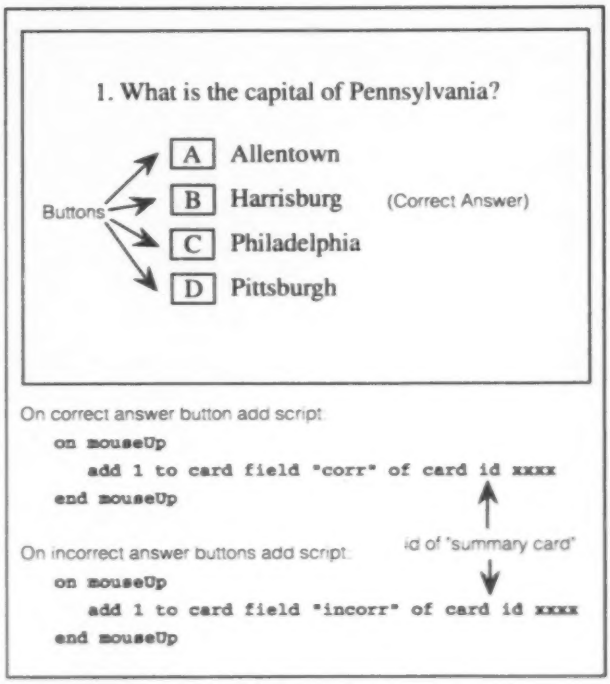
1. What is the capital of Pennsylvania?
Buttons
A Allentown
B Harrisburg (Correct Answer)
C Philadelphia
D Pittsburgh
On correct answer button add script:
on mouseUp
add 1 to card field "corr" of card id xxxx
end mouseUp
id of "summary card"
On incorrect answer buttons add script:
on mouseUp
add 1 to card field "incorr" of card id xxxx
end mouseUp

Figure 4. Question card and scripts for correct and incorrect answers

Notice that the choices A, B, C, and D are really buttons. To insert these buttons, click on the button tool on the tool palette and select New button under the Objects menu and a temporary new button will appear on the card. Double-click on the new button icon and you will see a dialog box (as shown in Figure 5). In this dialog box, you should name the button A, B, C, or D; link the button where you want it to go; select any special effect you want; and, finally, select Script and add the script for correct and incorrect answers. When finished, you should resize the button and move it in front of the choices in the question.

Summary Card

Your summary card will give the full name of the student, tell him or her how many questions were on the test, how many he or she answered correctly and incorrectly, what their percentage was, and will have a button to print the entire card. A typical summary card and the accompanying scripts are shown in Figure 6.

When the student prints out the card, this is what he or she will hand in to you for registering in your gradebook. The print button also sends him/her to the last card in the program where you should con-

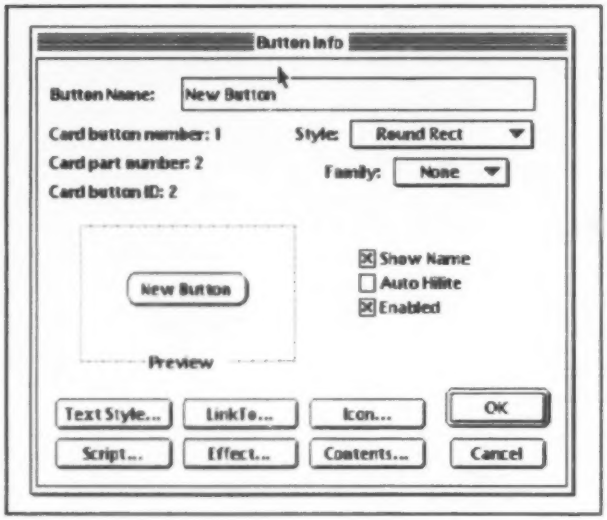

Figure 5.

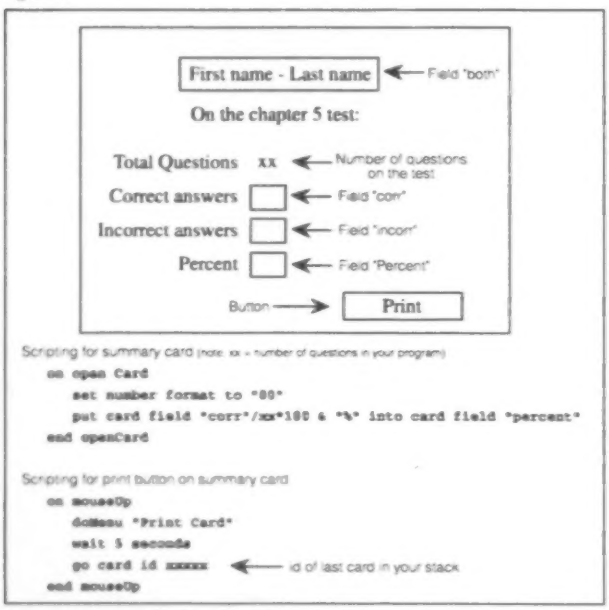

Figure 6. Summary card and scripting

vey to the student that the test is over and to turn in the print out. You should also include a button on the final card that says "Quit" so that when the student clicks on this button, *HyperCard* will close. The script of the button is:

```
on mouseUp
  doMenu "Quit HyperCard"
end mouseUp
```

Conclusion

A *HyperCard* testing program is relatively easy to construct and can be a great asset to an individualized classroom. You can make the program as "fancy" or as powerful as you wish, adding a background, commercially available graphics, or sound; making your own drawings; and so on. Whatever you prefer, it can be a valuable asset to your teaching strategy.

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Merrill, P.F., Hammons, K., Tolman, M.N., Christensen, L., Bincent, B.R., & Reynolds, P.L. (1992). *Computers in education* (2nd. ed.). Boston: Allyn and Bacon.

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HyperStudio 3.0 In One Hour: A Case Study Book Review

Thomas A. Drazdowski

HyperStudio 3.0 In One Hour
Author: Vicki F. Sharp
Copyright: 1995
Publisher and Address: International Society for Technology in Education, 480 Charnelton St., Eugene, OR 97401-2626
ISBN: 1-56484-091-3
Target Group: Ages 10 through adult
Subject: A guide for learning *HyperStudio 3.0* for the Macintosh

HyperStudio 3.0 In One Hour addresses a need for a text that offers an effective, step-by-step approach to learning *HyperStudio 3.0*, an authoring tool that allows users to develop fairly sophisticated multimedia stacks. As Roger Wagner, creator of the program and founder of Roger Wagner Publishing, Inc., explains in the interview that begins the textbook, his goal for *HyperStudio* was to create an authoring program that was accessible to everyone, from first grader to college professor, a program that could be used by people in "many wonderful and diverse ways" (p. xiv). This textbook by Vicki F. Sharp serves as a useful resource for those trying to reach Mr. Wagner's goal.

Section one of the text offers the user a short preface on what is meant by the term multimedia; an introduction to the basic terms used in the program, such as card, stack, and buttons; and instructions on how to install the program.

The heart of the text begins with section two, which contains a series of six minilessons on how to create a hypermedia stack entitled "African Safari." Lesson one deals with creating cards that have a background color, border, text, and clip art. Lesson two takes the user through adding buttons to cards to control actions (e.g., playing a sound) and creating transitional effects that will transport the user to other cards in the stack. Lesson three consists of building the second card in the stack and emphasizes how to use gradients for background color, how to create titles and text objects, and how to record a sound. The lesson ends by demonstrating how to link cards through button actions and how to use the "StoryBoard" feature to rearrange or delete cards. Lesson four teaches the user how to work with the various paint tools, copy and scale clip art, and add more navigational buttons to the cards. Lesson five explains how to add animation to objects through what *HyperStudio* labels "NBAs," or New Button Actions, which are really programs used to extend the functions of the software. This lesson also demonstrates how to add invisible sound buttons to your card. Finally, in lesson six, the reader creates the fourth and final card in this practice stack, learning how to import a background, how to use the "Roll Credits" NBA in combination with an automatic timer feature, how to add scanned images to cards and change the preferences for a stack, and how to add a final button that will return the user to the beginning of the stack. The chapter ends with a quick look at the "Ready Made Cards" that can be used. When the minilessons are completed, the reader is left with a relatively simple but highly functional stack that encompasses most of the major features of the authoring program.

Section three of the text deals with "Advanced Topics," including customizing colors; creating cel animation; and creating a card with special effects, such as "Cookie Cutter," "Layered Animation," "Hypertext Links," and "Hide Show" NBAs. The section ends with a short lesson on using *HyperStudio*'s "Testing Functions," a useful feature that will keep a record of the buttons that were pushed. This is followed by another short lesson on how to create a button that uses the programming language "HyperLogo."

The text then shifts in section four to how to use various kinds of equipment with *HyperStudio 3.0*, such as a QuickTake or QuickCam Camera, laserdisc player, and CD player. Also included are short lessons on how to create *QuickTime* movies, download pictures from the Internet, and open Web pages if you have *Netscape* available on your computer.

Section five deals exclusively with explaining a host of "New Buttons Actions" that were not used to create the "African Safari" stack (some of my preservice teachers especially enjoyed using the "GhostWriter" NBA, where letters seem to magically appear and disappear). Section six offers guidelines for planning a stack and some suggestions to help both teachers and students get started on their own stacks. Section seven ends the text with a list of "Keyboard Shortcuts" and "Picture References" to some of the resources available with the program.

This book delivers what it promises and should prove to be very useful to those trying to teach or learn *HyperStudio 3.0*. I recently used the text with preservice teachers in a multimedia design course. (I had previously used an earlier edition of the text that dealt with *HyperStudio 2.0* to teach the program to my elementary school daughters.) Both I and my students found that the many screen shots included in the text were extremely helpful and that the directions for card and stack construction were precise and easy to follow. After we completed the various lessons as a class, students told me that they found the book to be an essential resource as they began to independently design and develop their own multimedia stacks.

The book has some shortcomings, however. Additional readings will have to be supplied by instructors wishing to delve into instructional design theory and current research trends. A section on how to incorporate aspects of cooperative learning with multimedia use in the classroom would be beneficial. And I hope that in the next edition the author will consider integrating more of the advanced features, such as the use of *QuickTime*, laserdiscs, and the various "New Button Actions," into the minilessons section of the text. But for those looking for a solid how-to skills development book for *HyperStudio 3.0* that can be utilized at a variety of instructional levels, *HyperStudio 3.0 In One Hour* should prove to be invaluable.

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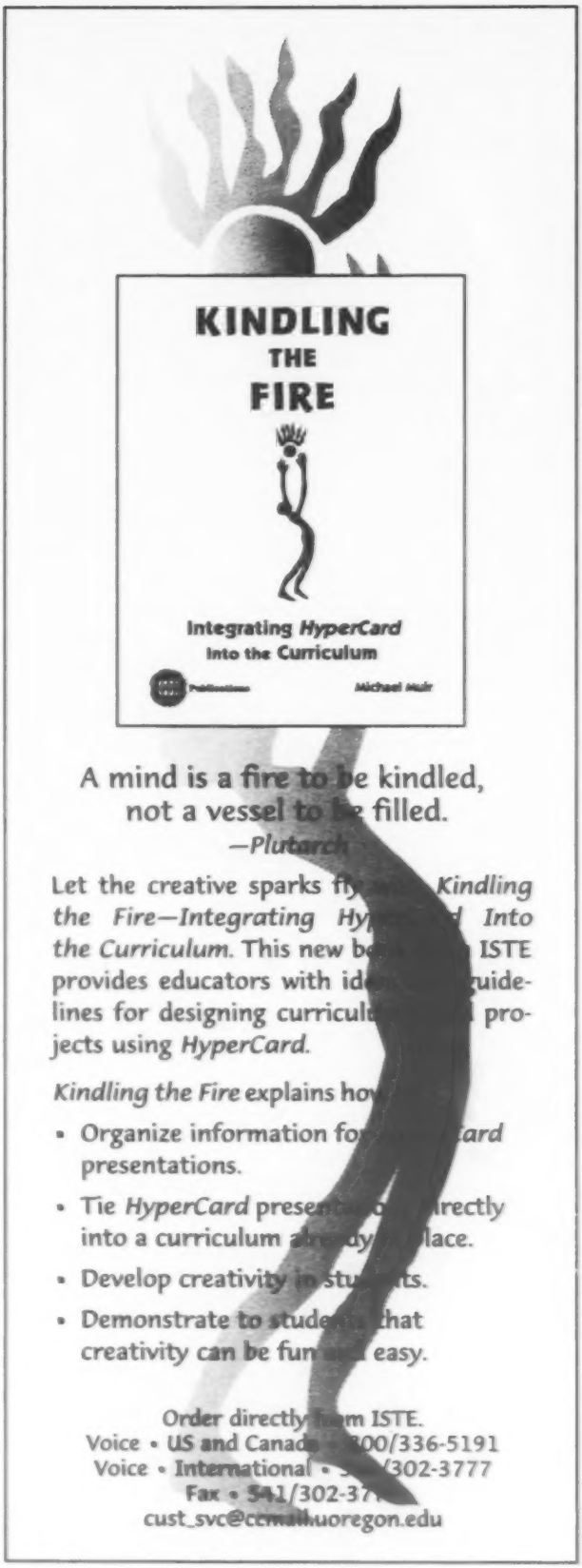
KINDLING
THE
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Integrating HyperCard
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Michael Muir
A mind is a fire to be kindled,
not a vessel to be filled.
—Plutarch
Let the creative sparks fly with Kindling the Fire—Integrating HyperCard Into the Curriculum. This new book from ISTE provides educators with ideas and guidelines for designing curriculum and projects using HyperCard.
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Case Study Review of Thinkin' Things

Sharron Redden

Thinkin' Things
Publisher: Creative Teacher, PO Box 425, Grover Beach, CA 93483; ph. 800/493-7380
Price: $39.95
Platform: Mac or DOS
Hardware: 1800K minimum RAM, 5.73MB available on your hard drive
Classification: Interactive learning tool
Domain: Home or school
Subject Area: Mathematics, musical creativity, memory, visual perception, auditory reception, spatial orientation, eye-hand coordination, and focus
Age Range: Observed: three years through 60 years, Publisher: Grades K–4
Reading Level: Auditory Cues

Thinkin' Things was designed to help students build memory, problem solving, logic, and other thinking skills. *Thinkin' Things* provides these opportunities and introduces geometric shapes with association and manipulation, object-banking trajectory, comparative analysis, depth perception, auditory discrimination, and reinforcement in each area while increasing eye-hand coordination. Based primarily on exploratory learning, *Thinkin' Things* incorporates the time-tested learning principles of "contiguity, repetition, and reinforcement" (Gagne, Briggs, & Wager, 1992).

Exploration commences the moment the user double-clicks the application icon. After the credits screen, music plays as a starry black sky background appears. The opening screen is soon filled with an orangutan on a drum painted with chickens in various styles of dress, a view screen on top of a music box, a loon on a box painted with strange little creatures, and a pale yellow moon rising in the background (see Figure 1).

Users presented with the opening screen have only one option: To start clicking on things to see what happens. The little red Stop sign that appears in the bottom left corner of all of the screens returns the user to the previous start sequence or closes the application. Clicking the moon causes it to rise again. Clicking any other object takes the user into an exploratory learning interaction module. Six different module choices are

Figure 1. Thinkin' Things opening screen

available from the opening screen. Clicking on the drum opens the screen that has a chicken pictured saying, "You can make a feathered friend," and a large mixing tank on the right with choice buttons attractively prominent (see Figure 2).

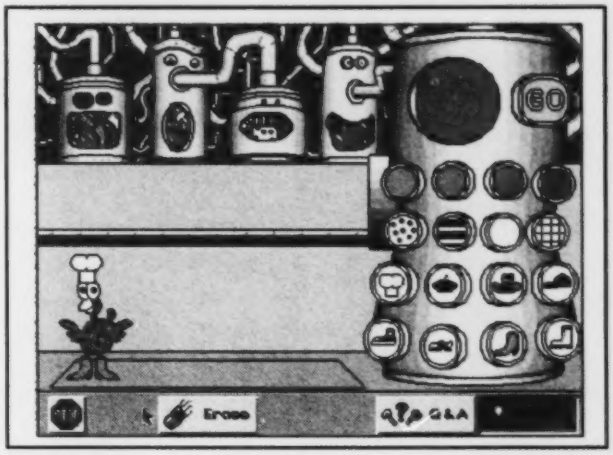

Figure 2.

In the Create mode, the user can dress or color the chicken in any style and click GO. Once mixed in the machines at the top of the screen, a mechanical hen proceeds from the mixer and drops an egg that cracks open to deposit the user's creation next to the first chicken. When all spaces are filled the chickens are removed in novel ways and the user can continue making more chickens.

In the Q & A mode, visual perception and sequencing are enhanced and developed by finding the missing elements from the cues presented in the starting sequence, in which the user is asked, "Can you make the missing bird?" Figure 3 shows this screen.

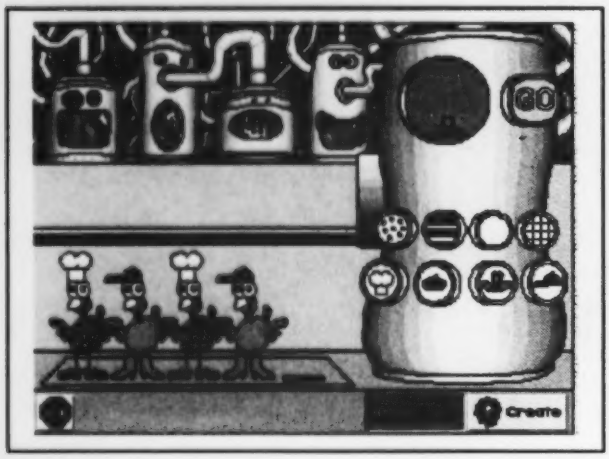

Figure 3.

Each learning unit progressively continues until the user chooses Stop, which returns the user to the opening screen, where other choices are available.

Clicking the orangutan on the opening screen (see Figure 1) opens the create mode for music, with the orangutan sitting behind an assortment of musical instruments stating "Hey, you go first." Users click each of the instruments to play them. Clicking the Play button causes the orangutan to repeat the users sequence. (See Figure 4.)

In Q & A mode, the orangutan plays a sequence and then asks, "Can you play that?" or says "Now your turn." A Dark choice is offered that allows the user to only hear the sequence and not see the instruments being played.

Clicking on the lower center box on the opening screen (see Figure 1) opens a unit that allows the user to manipulate and design geometric figures (see Figure 5). An Ideas choice is also offered. Each time Ideas is clicked, different presentations and demonstrations of geometric figure manipulations occur so that the user gains basic understanding of how to utilize the module.

Clicking the upper center box on the opening screen (see Figure 1) opens to a unit that allows the user to manipulate and design geometric spatial objects and observe trajectories and depth perspective (see Figure 6).

Clicking the lower right box on the opening screen (see Figure 1) opens to a unit that allows the user to

Figure 4.

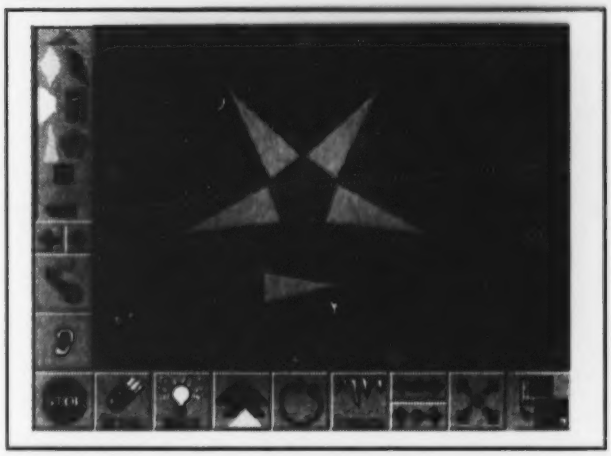

Figure 5.

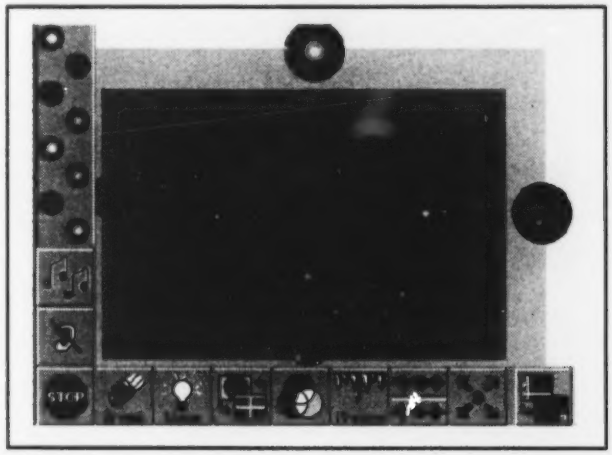

Figure 6.

interact with the customers verbal, faxed, and telephoned requests for specific Friggles, which are differentiated by color, hair style, spots, stripes, size, and so on (see Figure 7).

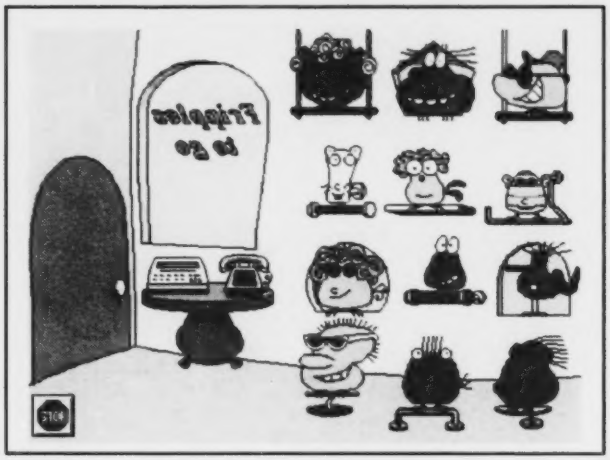

Figure 7.

Clicking the Tuney Loon on the opening screen (see Figure 1) opens a unit that allows the user to interact with the loon, playing singular and unique instruments similar to the orangutan unit (see Figure 8).

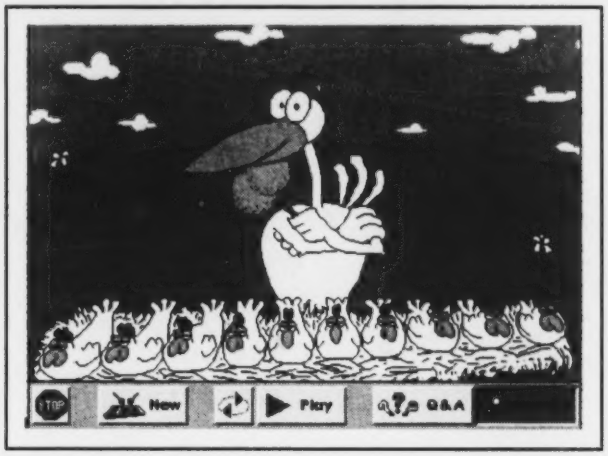

Figure 8.

Thinkin' Things offers intense modality training that cannot be replicated without computer interactive electronics. Prior training in these areas consisted of activities such as jacks, volleyball, basketball, baseball, and tennis, which are focused primarily on large-muscle motor groups and secondarily on fine motor control. The computer-human interaction speeds the process of fine motor control and allows specific modality addressing.

Observation of users pre-K through eighth grade evidences sustained interest with marked improvement in specific modalities. Users will complete any assignment in order to gain the opportunity to use *Thinkin' Things*, which is viewed as a "fun game."

Thinkin' Things is a discovery-learning application with visual and verbal cues, responses, and rewards. Because of the discovery approach and effective displays, textbooks, supplementary materials, or module customizations are not provided. User progress is not tracked, activity is by choice, bookmarks are not provided, and record keeping or reporting functions are not available.

The educational value of *Thinkin' Things* because of the self-paced, high-interest discovery approach is evidenced in the carry over to requisite subject areas and general thinking skills. The costs of using *Thinkin' Things* compared to other learning tools are very low. *Thinkin' Things* visually attractive, pick-and-choose, nontrapping, verbally cueing, and rewarding presentation holds the user's attention, building on and reinforcing previous learning while allowing innovative user-initiated approaches to problem solving.

This evaluator strongly recommends *Thinkin' Things 1.0.2p*, which may be purchased alone or as part of the *Thinkin' Things Collection* from Creative Teacher to any educator or parent seeking a tool to enhance cognitive and fine motor skills.

Reference

Gagne, R., Briggs, L., & Wagner, W., (1992). *Principles of instructional design* (4th ed.). Fort Worth, TX: Harcourt Brace Jovanovich.

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Letters

An open letter from the editor:

Dear SIG members,

ISTE has informed me that HyperSIG (sometimes SIGHyper) currently boasts over 1,000 paid members. If every copy is read by two people, there are over 2,000 readers per issue. We allocated two pages for letters in this issue but, alas, none arrived.

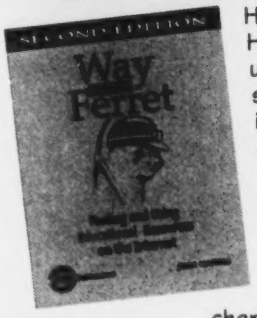
The Letters page is an informal opportunity for members to react to and build upon issues discussed in the journal, the schools, popular literature, and, of course, online. It is an opportunity to let us know about new directions you might like the journal to take.

Volume 7 number 1 will contain reports from NECC '96, which took place in Minneapolis in June. In addition to responding to issues noted above, if you wish to write about something that came up at NECC, that would be welcome in this space also.

Have a good summer, everyone.

Trudy
abramson@scis.nova.edu

CyberFerret



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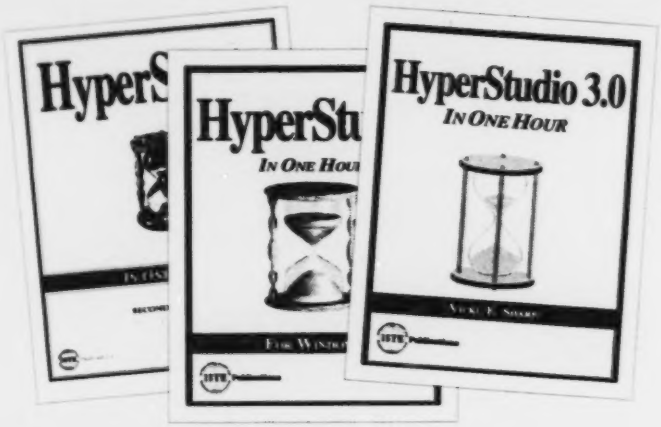

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HyperNexus Volume 6 Number 4

Hypermedia/Multimedia SIG

ISTE's newest special interest group brings together educators who use hypermedia and multimedia.

HyperSIG provides a forum for the exchange of ideas, collecting and disseminating information involving the use of hyper/multimedia in the classroom. Leading the way in assisting in the development of the use of hypermedia in education, this SIG is for the educator who wants to stay abreast of the field.

HyperNexus: Journal of Hypermedia and Multimedia Studies is the journal for the SIG. Published quarterly, *HyperNexus* brings together new ideas, new ways of thinking, and prominent voices in the area.

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HyperNexus is published quarterly by the International Society for Technology in Education Special Interest Group for Hypermedia and Multimedia. *HyperNexus* seeks articles on K-12 and college instructional applications of hypermedia and multimedia in teacher presentation and student learning. Case study product reviews are welcome.

Two double-spaced hard copies of manuscripts with screen dumps and an ascii file (noting platform and wordprocessor used) should be sent by land mail. Include your name, address, phone, and e-mail address. Receipt of manuscripts will be acknowledged electronically.

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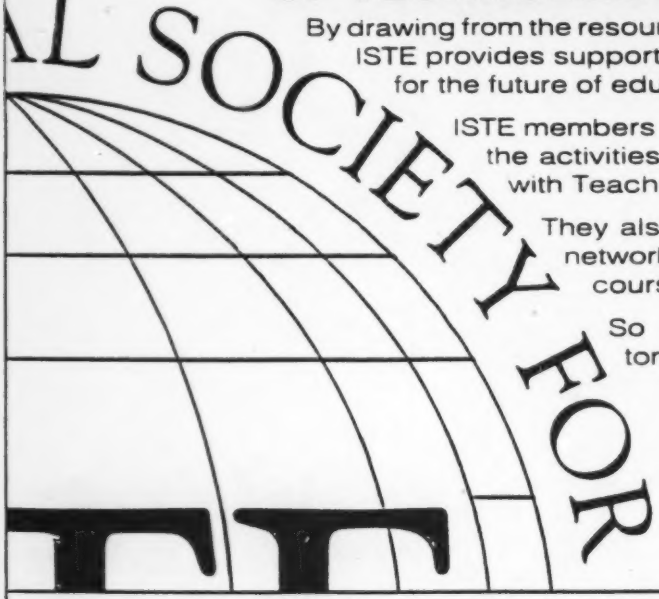

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